Learning and Labor

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UNIVERSITY OF ILLINOIS

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CONTENTS

"The practical farmer, the ingenious mechanic, the talented artist, the upright legislator or judge, the accomplished teacher, are only modifications or varieties of the original man. The man is the trunk; the occupations and professions are only different qualities of the fruit it yields. The development of the common nature, the cultivation of the germs of intelligence, uprightness, benevolence, truth, that belongs to all—these are the principle, the aim, the end; while special preparation for the field or the shop, for the forum or the desk, for the land or the sea, are but incidents."—*Horace Mann.*

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*Resigned Dec. 20, 1895.

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[For Subjects, see p. 237.]

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UNIVERSITY OF ILLINOIS

LOCATION

The University of Illinois has its seat in Champaign County, in the eastern central part of the state, between the cities of Champaign and Urbana, within the corporate limits of the latter. It is one hundred and twenty-eight miles southward from Chicago, at the junction of the Illinois Central, the Cleveland, Cincinnati, Chicago and St. Louis, and the Wabash railroads. The situation is a beautiful one, and the "art that doth mend nature" has added rare charms to the grounds and surroundings. The country around is one of the richest and most prosperous agricultural regions of the world, and the local municipalities, with a combined population of 15,000, are noted for public spirit and high moral tone.

HISTORY

In 1862 the national government donated to each state in the Union public land scrip apportioned in quantity equal to 30,000 acres for each senator and representative in congress, "for the endowment, support, and maintenance of at least one college, whose leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, * * * * in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

Under this act Illinois received scrip for 480,000 acres of land subject to location in any surveyed but unoccupied part of the public domain. Twenty-five thousand acres were thus located in Nebraska and Minnesota, and the remainder of the scrip was sold for what it would bring. Or the land which was secured, about 14,000 acres have been sold at from $10.00 to $15.00 an acre. In compensation for waiting something more than a quarter of a century, the land when

all sold will add to the endowment fund nearly as much as was obtained for the much greater proportion of the scrip originally sold. The entire principal sum received from the sale of scrip and of land is to be held inviolate as endowment, only the income being available for current expenditures.

To secure the location of the University several counties entered into a sharp competition by proposing to donate to its use specified sums of money, or their equivalent. Champaign county offered a large brick building, erected for a seminary and nearly completed, about 1,000 acres of land for a campus and farms, and $100,000 in county bonds. To this the Illinois Central railroad added $50,000 in freight. In consideration of this offer the institution was located, May 8, 1867, in the suburbs of Urbana, adjoining Champaign.

The state legislature has from time to time appropriated various sums for permanent improvements, as well as for maintenance. The present value of the entire property and assets is estimated at $1,600,000.

The institution was incorporated under the name of the Illinois Industrial University the last day of February, 1867, and placed under the control of a board of trustees constituted of the governor, the superintendent of public instruction, and the president of the state board of agriculture, as *ex-officio* members, and twenty-eight citizens appointed by the governor. The chief executive officer, usually called president, was styled regent, and he was made, *ex officio*, a member of the board and presiding officer both of the board of trustees and of the faculty.

In 1873 the board of trustees was reorganized by the reduction of the number of appointed members to nine and of *ex-officio* members to two, the governor and the president of the state board of agriculture. In 1887 a law was passed making membership elective at a general state election and restoring the superintendent of public instruction as an *ex-officio* member. There are, therefore, now three *ex-officio* members and nine by public suffrage. Since 1873 the president of the board has been chosen by the members thereof from among their own number, for a term of one year.

The University was opened to students March 2, 1868, at which time there were present, beside the regent, three professors and about fifty students. During the first term

another instructor was added, and there was a total enrollment of 77 students, all young men.

During the first term instruction was given in algebra, geometry, physics, history, rhetoric, and Latin. Along with this, work on the farm and gardens or around the buildings was compulsory for all students. But in March of the next year compulsory labor was discontinued, save when it was made to serve as a part of class instruction. A chemical laboratory was fitted up during the autumn of 1868, and students then began practical work in the department. Botanical laboratory work was commenced the following year. In January, 1870, a temporary mechanical shop was fitted up with tools and machinery, and in this little wooden building, originally constructed for a carpenter shop, was begun the *first shop-instruction* given in any American university. During the summer of 1871 a large brick structure, the present Engineering Laboratory, was erected and equipped for students' shop work in both wood and iron. A diploma of merit was awarded for the exhibition in this line made at the Centennial Exposition.

By vote, March 9, 1870, the trustees admitted women as students, and during the year 1870–71 twenty-four availed themselves of the privilege. Since that time they have constituted from one-sixth to one-fifth of the total number of students.

By the original state law certificates showing the studies pursued and the attainments in each were given instead of the usual diplomas and degrees. The certificates proved unsatisfactory to the holders, and, on petition of the alumni, the legislature, in 1877, gave the University authority to confer degrees.

Upon request of the alumni, seconded by the trustees and faculty, the legislature, in 1885, changed the name of the institution to the "University of Illinois."

During the same session of the legislature a bill was passed transferring the State Laboratory of Natural History from the Illinois State Normal University to the University of Illinois. This laboratory was created by law for the purpose of making a natural history survey of the state, with the publication of the results in a series of bulletins and reports, and for the allied purpose of furnishing specimens illustrative of the flora and fauna of the state to the public schools, and to the state

museum. For these purposes direct appropriations are made by the legislature from session to session. A large amount of material has been collected and extended publications have been made in both the forms above mentioned.

By an act approved March 2, 1887, the national government appropriated $15,000 per annum to each state for the purpose of establishing and maintaining, in connection with the colleges founded upon the congressional act of 1862, agricultural experiment stations, "to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science." Under this provision the station for Illinois was placed under the direction of the trustees of the University and its grounds were located on the University farm. At least one bulletin of results is published every three months, and they are for gratuitous distribution. Editions of 17,000 copies are now issued.

For the more complete endowment of the state institutions founded upon the act of 1862, the congress of the United States, by a supplementary law passed in 1890, made further appropriations. Under this enactment each such college or university received the first year $15,000, the second $16,000, and likewise thereafter $1,000 per annum additional to the amount of the preceding year. The annual increase is to continue until the amount reaches $25,000, which sum is then to be paid yearly thereafter.

The total appropriations by the state to the University for all purposes to date amount to $1,303,000.

BUILDINGS AND GROUNDS

The land occupied by the University and its several departments embraces about 210 acres, including experimental farm, orchards, forest plantation, arboretum, ornamental grounds, and military parade grounds.

The *Chemical Laboratory* is a building 75 by 120 feet, and two stories high, besides well lighted basement and mansard stories. It contains the general laboratories for students, instructors' laboratories, lecture rooms, store rooms, scale rooms, and various apartments for special purposes.

Engineering Hall has a frontage of 200 feet, a depth of 76 feet on the wings and 138 feet in the center. The middle wing is 72 feet wide. The first story of the west and central wings contains the laboratories of the department of electrical engineering, while the east wing is devoted to masonry laboratories and instrument rooms of the department of civil engineering. The central wing of the second story contains the lecture room and the preparation rooms of the department of physics, the remainder of the floor being used by the departments of civil and municipal engineering for recitation and drawing rooms, cabinets, and studies. The middle wing of the third story contains the laboratories of the department of physics, and the side wings the drawing rooms, lecture rooms, cabinets, and studies of the mechanical department. The central portion contains the library, the office, and the faculty parlor. The fourth story is devoted entirely to the department of architecture, and contains drawing and lecture rooms, cabinets, photo studio, and a blue-print laboratory.

The Engineering Laboratory (formerly Machinery Hall) are in a brick building two stories high, 126 feet in length, and 88 feet in width, which contains the laboratory of applied mechanics, the hydraulic laboratory, and the mechanical engineering laboratory. The wood shop of the mechanical engineering department is situated on the second floor of this building. A room on the first floor is reserved as a repair shop, and is in charge of the Superintendent of Buildings and Grounds.

Machinery Building.—This name will be applied to the building, erected during the fall of 1895, which contains the machine shop, forge shop, and foundry of the Mechanical Engineering Department. It is a one-story brick building, 50 by 250 feet, and contains a lecture room, office rooms, machine shop, foundry, and forge shop. This last is a room 48 by 140 feet. On each side of the machine shop is a line shaft $2\frac{1}{2}$ inches in diameter. A three-ton traveling crane of 12 feet span covers the center of the floor for the entire length, extending over a driveway 10 feet wide at the east end of the shop. The floor of the driveway is paved and is 3 feet below the floor of the machine shop.

The foundry comes next to the machine shop, the floor being on the level of the driveway. A large wing extends

north from the center of the foundry, containing core ovens, rattler, and cupola.

The forge shop adjoins the foundry, at the eastern end of the building.

Military Hall, 100 by 150 feet in one grand hall, gives ample space for company and battalion manœuvers and for large audiences upon special occasions. It is also used as a gymnasium, for which purpose there are dressing rooms with lockers. A bath room is provided.

Natural History Hall is a handsome building, 134 by 94 feet, with basement, two main stories, and an attic. It is occupied by the departments of botany, zoölogy, physiology, mineralogy, and geology, for each of which there are laboratories, lecture rooms and offices; it also contains the office and equipments of the State Laboratory of Natural History, and of the State Entomologist, as well as the office and library of the Agricultural Experiment Station. There are six laboratory rooms on each of the main floors—sufficient altogether to accommodate two hundred students, besides offering abundant facilities for the private work of the instructors.

University Hall occupies three sides of a quadrangle, measuring 214 feet in front and 122 feet upon the wings. Besides numerous class rooms it contains the office of the President, the museum, the library, and the art gallery.

There are, in addition to these buildings, a veterinary hall, an astronomical observatory, four dwellings, two large barns, and a greenhouse.

ART GALLERY

The University art gallery was the gift of citizens of Champaign and Urbana. It occupies a room 61 by 79 feet in University Hall, and the large display of art objects has surprised and delighted all visitors. In sculpture it embraces thirteen full-size casts of celebrated statues, including the Laocoön group, the Venus of Milo, etc., forty statues of reduced size, and a large number of busts, ancient and modern, bas reliefs, etc., making over four hundred pieces in all. It includes also hundreds of large autotypes, photographs, and fine engravings, representing many of the great masterpieces of painting of nearly all the modern schools; also a gallery of historical portraits, mostly large French lithographs of peculiar

fineness, copied from the great national portrait galleries of France.

Other collections of special value to art students embrace a large number of casts of ornament from the Alhambra and other Spanish buildings, presented by the Spanish government; a set of casts from Germany illustrating German Renaissance ornament; a series of art work from the Columbian Exposition, and large numbers of miscellaneous casts, models, prints, and drawings, such as are usually found in the best art schools.

A notable feature of the collection of works of art is the gift of Henry Lord Gay, architect, of Chicago. It consists of a model in plaster and a complete set of drawings of a competitive design for a monument to be erected in Rome, commemorative of Victor Emanuel, first king of Italy. The monument was to be of white marble, an elaborate Gothic structure, beautifully ornamented, and 300 feet high. Its estimated cost was to have been seven and a quarter millions of francs. The design was placed by the art committee second on a list of 289 competitors.

LIBRARY

The library, selected with reference to the literary and scientific studies required in the several courses, had, March 1, 1896, 28,200 volumes and 6,200 pamphlets.

The large library hall is open throughout the day for study, reading, and reference work. It is intended that the use of the library shall largely supplement the class-room instruction in all departments. Constant reference is made in classes to works contained in the library, and their study is encouraged or required. On the same floor as the library is the reading room of the University, well supplied with daily papers and the more important weekly and monthly periodicals, both literary and scientific. The new library building, in process of erection, will soon enable the University to offer its members greatly increased library facilities.

The library of the State Laboratory of Natural History and that of the Agricultural Experiment Station are both open to students of the University. They contain over 7,000 volumes, several thousand pamphlets, and 150 series of periodicals.

LABORATORIES

SCIENCE LABORATORIES*

The *botanical*, *geological*, *physiological*, and *zoölogical laboratories* are in Natural History Hall. There has been added to the botanical laboratory during the present year a glazed addition, 14 by 19 feet, two stories in height, to facilitate experiments upon living plants exposed to sunshine.

The *chemical laboratory*, already described, is entirely devoted to chemistry.

The *physics laboratories* are in Engineering Hall. They are well arranged, and provided with all modern conveniences.

The *psychological laboratory* in Natural History Hall is well provided with apparatus of many different kinds for use in experimental study, research, and instruction.

ENGINEERING LABORATORIES

The *cement laboratory* of the department of civil engineering occupies two large rooms in Engineering Hall, and is provided with slate tables, testing machines, molding machines, sieves, etc., and twenty-four sample barrels of hydraulic cement, varieties of sand and other necessary materials.

The *electrical engineering laboratories* are partly in Engineering Hall and partly in University Hall.

The *mechanical laboratory* occupies a large part of both floors of Engineering Laboratory and each of its departments is equipped for practical work by students.

The *testing laboratory*, located in Engineering Laboratory, gives opportunity to students of the College of Engineering to make various practical experiments and tests, and to prosecute original investigation in their specialties.

SPECIAL LABORATORIES FOR RESEARCH

The *laboratory of the Agricultural Experiment Station* occupies the top floor of the Chemical Laboratory.

The laboratory rooms of the *State Laboratory of Natural History* are in Natural History Hall.

A *Biological Experiment Station* has been established by the University on the Illinois River at Havana, Illinois, and equipped for field and experimental work in aquatic biology. It has its separate staff, but is open to students of the University

*For a more detailed account of these laboratories, see under the appropriate college.

at all times on application, and to special students not otherwise connected with the University during the summer months.

A laboratory for *sanitary water analysis* has recently been equipped with all necessary appliances, and chemical investigation of the water supplies of the state is now under way.

COLLECTIONS*

AGRICULTURAL

A large room in University Hall is devoted to the exhibition of the products of the industrial arts, especially of agriculture. Prominent among the agricultural specimens exhibited is an excellent collection of the sub-species and varieties of Indian corn, including the best of their kinds. There is also a considerable collection of small grains and of grasses; a collection of fibres in various states of manufacture; a series of analyses of grains, showing at a glance the elements and proportion of structure, and a large collection illustrating the forestry of Illinois, Florida, and California. The exhibits made by the University at the Centennial and at the Cotton Exposition at New Orleans find a permanent abode in this apartment; very large additions have also been made of materials received from the Columbian Exposition of 1893.

BOTANICAL

The herbarium contains nearly all the species of flowering plants indigenous to Illinois, including a complete set of grasses and sedges. The flora of North America is fairly well represented, and a considerable collection of foreign species has been made. A collection of fungi includes a very full set of those most injurious to other plants, causing rusts, smuts, moulds, etc. A collection of wood specimens from two hundred species of North American trees well illustrates the varieties of native wood.

Plaster casts represent fruits of many of the leading varieties as well as interesting specimens of morphology, showing peculiarities of growth, effects of cross-fertilization, etc.

ENGINEERING

The following departments of the College of Engineering

*For a more detailed account of the collections in the different departments, see the appropriate subject under each college.

have made extensive and very valuable collections, which will be found in their rooms in Engineering Hall.

Architecture

A large number of specimens of stone, bricks, terra cotta, sanitary fittings, casts of mouldings and of ornament have been accumulated, together with some excellent specimens of industrial arts, models of structures, working drawings of important buildings, 2,200 lantern slides, and 17,000 plates and photographs.

Civil Engineering

The Civil Engineering department has a large room containing samples of iron, steel, wood, brick, and stone; materials for roads and pavements; models of arches and trusses, one of the latter being full-sized details of an actual modern railroad bridge. The department also possesses a very large collection of photographs and blue-print working drawings of bridges, metal skeleton buildings, masonry structures, and standard railroad construction.

Electrical Engineering

A number of display boards of wires and cables have been accumulated, together with collections of carbons, insulators, lighting specialties, signaling devices, primary and secondary cells, rail bonds, and several hundred photographs, blue prints, and pamphlets descriptive of the best modern practices in Electrical Engineering.

Mechanical Engineering

This department owns a partial set of Reuleaux models, models of valve gears; sections of steam pumps, injectors, valves of various kinds, skeleton steam and water gauges, standard packings, steam-pipe coverings, drop forgings; fine examples of castings, perforated metal, sets of drills and samples of oil, plates from exploded boilers and examples of defective boiler plates, and samples of iron and steel. A large number of working drawings from leading firms and from the U. S. Navy Department form a valuable addition to the above collections.

GEOLOGICAL

Lithology is represented by type collections of rocks (2,900 specimens), arranged to illustrate Rosenbusch, from Voigt

and Hochgesang, Dr. L. Eger, and A. Kranz; a type collection from Ward; a large number of ornamental building stones, and a stratigraphic collection to illustrate Illinois geology.

The *mineralogical* collection is especially rich in rock-forming minerals, ores, and materials of economic value. It contains over 7,000 specimens which have been carefully selected to meet the wants of the student.

The *paleontological* collection (43,400 specimens) contains representative fossils from the entire geologic series, but is especially rich in palæozoic forms. It embraces the private collections of Dr. A. H. Worthen, including 650 type specimens; that of Tyler McWhorter, presented by himself; that of Rev. Mr. Hertzer, acquired by purchase; the Ward collection of casts, presented by Hon. Emory Cobb, and a considerable number of special collections representing the fauna and flora of particular groups.

A series of relief maps of noted localities adds greatly to the facilities for illustration.

ZOÖLOGICAL

The *zoölogical* collections have been specially selected and prepared to illustrate the courses of study in natural history, and to present a synoptical view of the zoölogy of the state.

The mounted mammals comprise an unusually large and instructive collection of the ruminants of our country, including male and female moose, elk, bison, deer, antelope, etc., and also several quadrumana, large carnivora and fur-bearing animals, numerous rodents, good representative marsupials, cetaceans, edentates, and monotremes. Fifty species of this class are represented by eighty specimens. All the orders, excepting the Proboscidea, are represented by mounted skeletons. There is also a series of dissections in alcohol, illustrating the comparative anatomy of the group.

The collection of mounted birds includes representatives of all the orders and families of North America, together with a number of characteristic tropical, Bornean, and New Zealand forms. The collection is practically complete for Illinois species. Many of the specimens are excellent examples of artistic taxidermy. There is also a fine collection of the nests

and eggs of Illinois birds. A series of several hundred unmounted skins is available for the practical study of species, and the internal anatomy is shown in alcoholic dissections and in mounted skeletons of all the orders.

The cold-blooded vertebrates are represented by a series of mounted skins of the larger species, both terrestrial and marine; mounted skeletons of typical representatives of the principal groups; alcoholic specimens, both entire and dissected; and casts. The alcoholics include series of the reptiles, amphibians, and fishes, the latter comprising about three hundred species. The dissections illustrate the internal anatomy of the principal groups. The casts represent about seventy-five species, nearly all fishes.

The Mollusca are illustrated by alcoholic specimens of all classes and orders, and dissections showing the internal anatomy of typical forms. There are several thousand shells belonging to seventeen hundred species. The collection of Illinois shells is fair but incomplete.

Of the Arthropoda the entomological cabinet contains about three thousand species (principally American), named, labeled, and systematically arranged. There is also a series of Crustacea, some dried but mostly in alcohol, the latter including a number of dissections.

The lower invertebrates are represented by several hundred dried specimens and alcoholics, and by a large series of the famous Blaschka glass models.

The embryology of vertebrates and invertebrates is illustrated by a set of Ziegler wax models, and several series of slides, sections, and other preparations.

In addition to the above, the extensive collections of the State Laboratory of Natural History are available for illustrative purposes, as well as for original investigation by advanced students.

THE MUSEUM

The *Museum of Zoölogy* occupies a room in University Hall, and contains important collections selected to illustrate the courses in natural history and to present a synoptical view of the zoölogy of the state.

ADMISSION

Applicants for admission to the freshman class must be at least sixteen years of age, and it is desirable that they should be two or three years older than this. No distinction is made with regard to sex, nativity, color, or place of residence.

Entrance may be made at any time, provided the candidate is competent to take up the work of the classes then in progress; but it is very much better to begin upon the first collegiate day in September, when a large number of the classes are organized, very many of them to continue during the year.

Admission to the freshman class of the University may be obtained in one of four ways: (a) by certificate from an accredited high school; (b) by examination; (c) by transfer of credits from some other college or university; (d) by obtaining permission to enter certain classes as a special student.

ADMISSION BY CERTIFICATE FROM ACCREDITED HIGH SCHOOLS*

Certain public high schools and a few private preparatory schools have been, after examination, approved by the Faculty of the University, and full graduates of these schools are admitted to the freshman class without examination. Candidates for admission in this way must file with the Registrar upon entrance a certificate of graduation and of preparatory studies. Blanks for these certificates must be obtained of the Registrar in advance, and it is better to forward them to him for approval before registration days.

ADMISSION BY EXAMINATION

Examinations of candidates for admission to the University, are held at the University on the Thursday, Friday, and Saturday before the beginning of the fall term in September, and on the two days previous to the opening of each of the other terms. Each candidate must be in attendance during the whole period of the examinations.

*For an account of these, see page 220.

The scholarship examinations* held each year on the first Saturday in June and the day preceding, in counties in which there are applicants for state scholarships, afford an opportunity to pass the entrance examinations before coming to the University, as the examinations will be equivalents.

The subjects upon which the entrance examinations are held are described below.

The physics, physiology, and botany described are each required as preparatory to these subjects as taught in this University. The text-books are named merely to aid in showing the requirements. Equivalents are accepted.

Entrance to the University means admission to some one of the colleges of the University—College of Literature and Arts, College of Engineering, College of Science, or College of Agriculture.†

The examinations which a candidate is required to pass depend in part on which of the four colleges of the University he intends to enter. In the following statement of subjects for examination, those requirements which are common to all the colleges are given first; then follow statements of the additional requirements for each college. To determine on what subjects he must pass examinations, then, a candidate must add to the uniform requirements first stated those classed as additional for the particular college he wishes to enter.

Subjects in which all Candidates for Admission must be Examined

[For additional requirements for the different colleges, see pages 38–40.]

1. ALGEBRA.—Fundamental operations, factoring, fractions, simple equations, involution, evolution, radicals, quadratic equations, and equations reducible to the quadratic form, surds, theory of exponents, and the analysis and solution of problems involving these. The subject as given in Wells's Higher Algebra through quadratic equations, or the same work in Wentworth's Algebra, or an equivalent.

2. COMPOSITION AND RHETORIC.—Correct spelling, capitalization, punctuation, paragraphing, idiom, definition, and proper use of rhetorical figures; the elements of Rhetoric. The candidate will be required to write two paragraphs of

* See page 220.
† See Organization, page 44.

about one hundred and fifty words each to test his ability to use the English language.

3. ENGLISH LITERATURE.—(a) Each candidate is expected to have read certain assigned literary masterpieces, and will be subjected to such an examination as will determine whether or not he has done so. The books assigned for the next three years are as follows:

1896.—Shakspere's A Midsummer Night's Dream; Defoe's History of the Plague in London; Irving's Tales of a Traveler; Scott's Woodstock; Macaulay's Essay on Milton; Longfellow's Evangeline, and George Eliot's Silas Marner.

1897.—Shakspere's As You Like It; Defoe's History of the Plague in London; Irving's Tales of a Traveler; Hawthorne's Twice-Told Tales; Longfellow's Evangeline, and George Eliot's Silas Marner.

1898.—Milton's Paradise Lost, Books I. and II.; Pope's Iliad, Books I. and XXII.; The Sir Roger de Coverley Papers in The Spectator; Goldsmith's The Vicar of Wakefield; Coleridge's Ancient Mariner; Southey's Life of Nelson; Carlyle's Essay on Burns; Lowell's Vision of Sir Launfal; Hawthorne's House of The Seven Gables.

(b) In addition to the above the candidate will be required to present a brief outline of American Literature. Hawthorne and Lemmon's Outline of American Literature, or an equivalent.

4. GEOMETRY.—Plane Geometry as given in Wells's or Wentworth's Geometry, or an equivalent. Great importance is attached to the ability of the student to solve original problems.

5. HISTORY.—At least one year in one of the following subjects: (a) English and United States History; (b) General History; or (c) Greek and Roman History. The following text-books indicate the scope of the requirements: Guest & Underwood's Handbook of English History; Thomas's History of the United States; Oman's History of Greece; Allen's Short History of Rome.

6. PHYSICS.—The elements of physical science as presented in such text-books as Appleton's School Physics, or Avery's Elements of Natural Philosophy, or Carhart & Chute's Elements of Physics, or Gage's Elements of Physics. The candidate must have had laboratory practice as given in Hays, Lowry & Rishel's Laboratory Manual of Physics, or an equivalent.

In addition to the preceding subjects, any two of the following:

7. ASTRONOMY.—The subject as given in Young's Elements of Astronomy, or Newcomb & Holden's Astronomy for High Schools.

8. BOTANY.—The parts and organs of plants, in the descriptive language of the science; the relations of plants to the atmosphere, to temperature, light, soil, etc., to the inferior animals, and to man; characteristics of prominent orders, and the determination of species by use of an artificial key. Gray's School and Field Book of Botany.

9. CHEMISTRY.—Elementary Inorganic Chemistry as presented in Freer's Elementary Chemistry; Shepard's Elements of Chemistry; Williams's Elementary Chemistry; Storer and Lindsey's Manual of Elementary Chemistry; Armstrong & Norton's Laboratory Manual of Chemistry, or Clark's Elements of Chemistry. Laboratory practice is essential for preparation in this subject.

10. PHYSIOLOGY.—The anatomy, histology, and physiology of the human body and the essentials of hygiene, taught with the aid of charts and models and demonstrations upon inferior animals, to the extent given in Martin's Human Body (Briefer Course).

11. ZOÖLOGY.—The subject as taught in the best high schools with laboratory facilities. Mere text-book work will not be accepted. The following will indicate the scope of the work required: Colton's Practical Zoölogy; Parker's Elementary Biology, and Thompson's Outlines of Zoölogy.

ADDITIONAL REQUIREMENTS FOR ADMISSION TO THE COLLEGE OF LITERATURE AND ARTS

[The following, in addition to the requirements on page 36ff.]

12. ENGLISH LITERATURE.—The candidate will be examined on the subject-matter, form and substance of one or more books in addition to those named under (3). For 1896, 1897, and 1898 the books will be selected from the lists below. The examination will be of such a character as to require a minute and thorough study of each of the works named in order to pass it successfully.

1896.—Shakspere's The Merchant of Venice; Milton's L'Allegro, Il Penseroso, Comus, and Lycidas; and Webster's First Bunker Hill Oration.

1897.—Shakspere's The Merchant of Venice; Burke's Speech on Conciliation with America; Scott's Marmion, and Macaulay's Life of Samuel Johnson.

1898.—Shakspere's Macbeth; Burke's Speech on Conciliation with America; De Quincey's The Flight of a Tartar Tribe; Tennyson's The Princess.

13. LATIN.—Four books of Caesar's Commentaries, six orations of Cicero, six books of Vergil's Aeneid, the scansion of hexameter verse and Latin composition based on the reading above specified. Increasing importance is placed on ability to write Latin and on a knowledge of the quantity of the vowels. Candidates are urged to make special preparation in these directions. It is recommended that not more than two books of Caesar be read, and that other authors be substituted for the books omitted. Equivalents for any of the above requirements will be accepted. Allen & Greenough's, Bennett's, or Harkness's Latin Grammar is recommended and Collar's or Daniell's Latin Prose Composition. The Roman pronunciation is used. Frequent oral reading throughout the whole of the preparatory course is especially urged.

Students desiring to pursue Greek in the University must have also the following, which will be accepted instead of the three sciences otherwise required:

14. GREEK.—Grammar, a thorough knowledge of forms and syntax; an amount of Prose Composition equal to that given in Woodruff's Greek Prose Composition; three books of Homer's Iliad, except lines 494–759 of Book II.; three books of Xenophon's Anabasis, or an equal amount of text from some other classic prose author.

Additional Requirements for Admission to the College of Engineering

[The following, in addition to the requirements stated on page 36ff.]

15. FREE-HAND DRAWING.—Ten hours a week for one term, or the equivalent thereof. The nature of the work is indicated by Cross's Free-Hand Drawing.

16. GEOMETRY.—Solid and spherical geometry as given in Wells's or Wentworth's Plane and Solid Geometry, or an equivalent.

One of the following:

17. FRENCH.—Elements of grammar, tested by the translation of simple French prose at sight. At least one year's

work. Chardenal's Complete French Course, or an equivalent, and about 300 pages of easy prose.

18. GERMAN.—Elements of grammar, tested by the translation of easy German prose. At least one year's work. Joynes-Meissner's German Grammar, Joynes's German Reader, or equivalents, and 100 pages of easy prose.

19. LATIN.—Elements of grammar, tested by the translation of easy Latin prose. At least one year's work. Allen & Greenough's Grammar and Viri Romae, or an equivalent.

Additional Requirements for Admission to the College of Science

[The following, in addition to the requirements stated on page 36ff.]

16. GEOMETRY.—Solid and spherical geometry as given in Wells's or Wentworth's Plane and Solid Geometry, or an equivalent.

One of the following:

17. FRENCH.—Elements of grammar, tested by the translation of simple French prose at sight. At least one year's work. Chardenal's Complete French Course, or an equivalent, and about 300 pages of easy prose.

18. GERMAN.—Elements of grammar, tested by the translation of easy German prose. At least one year's work. Joynes-Meissner's German Grammar, Joynes's German Reader, or equivalents, and about 100 pages of easy prose.

19. LATIN.—Elements of grammar, tested by the translation of easy Latin prose. At least one year's work. Allen & Greenough's Grammar, and Viri Romae, or an equivalent.

Additional Requirement for the College of Agriculture

[The following, in addition to the requirements stated on page 36ff.]

16. GEOMETRY.—Solid and spherical geometry as given in Wells's or Wentworth's Plane and Solid Geometry, or an equivalent.

Program of Examinations, Sept. 3–8, 1896

All persons who wish to enter the University at the opening of the fall term, 1896, except those holding certificates of graduation from accredited schools and scholarship certificates and those for whom a transfer of all entrance credits from

some other college, or University has already been approved, must present themselves at the registrar's office, room 14, University Hall, at 9 o'clock a.m., Thursday, September 3d. At that time applications for admission will be received, and applicants will be given all necessary directions as to examinations.

The program of examinations is as follows

History	Thursday	1:00 p.m.
Physics	"	3:00 "
Algebra	Friday	8:00 a.m.
Physiology	"	1:00 p.m.
Botany	"	3:00 "
Geometry	Saturday	8:00 a.m.
Zoölogy	"	1:00 p.m.
German	"	3:00 "
English Literature and Composition	Monday	8:00 a.m.
French	"	1:00 p.m.
Chemistry	"	3:00 "
Latin	Tuesday	8:00 a.m.
Free-Hand Drawing	"	9:30 "
Astronomy	"	1:00 p.m.
Greek	"	3:00 "

ADMISSION BY TRANSFER FROM OTHER COLLEGES AND UNIVERSITIES

A person who has entered another college or university of recognized standing will be admitted to this University upon his presenting a certificate of honorable dismissal from the institution from which he comes and an official statement of the subjects upon which he was admitted to such institution, provided it appears that the subjects are those required here for admission by examination, or real equivalents. Candidates, to enter the University in this way, should submit such papers to the Registrar before the time of entrance, so that all doubtful points may be cleared up in advance.

ADMISSION AS SPECIAL STUDENTS

Persons over twenty-one years of age, not candidates for a degree, may be admitted to classes, after satisfying the President and professor in charge of the department in which such classes are taught, that they possess the requisite information and ability to pursue profitably, as special students, the chosen

subjects. Such students are not matriculated; they pay a tuition fee of five dollars a term and incidental fees.

ADMISSION TO ADVANCED STANDING

After satisfying in some of the ways already enumerated all the entrance requirements for admission to the freshman class of the college which he wishes to enter, the applicant for advanced standing may secure such standing either by examination or by transfer of credits from some other college or university.

1. *By Examination.*—Candidates for advanced standing, not from other colleges or universities, may secure such standing on examination only. In the case of freshmen students seeking advanced standing on the basis of their preparatory work, such standing shall be granted after satisfactory examination only.

2. *By Transfer of Credits.*—Credits from other colleges or universities may be accepted by the faculty for advanced standing; but at least one year's residence at the University and the completion of one year's work are necessary to secure a bachelor's degree.

In all cases, a certificate of honorable dismissal is required, together with a certified record of work done in the institution from which the applicant comes. These should be presented for approval some time before the student enters for work.

REGISTRATION

At the beginning of each term each student must present himself for registration within the time set for that purpose before the formation of classes, and he must be present at the first exercise of each class he is to attend.

EXAMINATIONS

Examinations are held as often as in the judgment of the instructor the necessities of the work require. Examinations are also given at the close of each term, on the work of the term, in all subjects except those whose character renders it unnecessary or impracticable. Students who are conditioned in these examinations are required to take a second examination

soon after the beginning of the following term. Those who fail to pass the term examination are precluded from proceeding with any University work without special permission.

A record is kept of each student's standing.

TERMS AND VACATIONS

The University year is divided into three terms. The first covers fourteen weeks of instruction and each of the others eleven. There is a vacation of two weeks at the end of the first term, and of one week at the end of the second. For the dates of opening and closing see the calendar, p. —.

GRADUATION

The requirements for graduation are specified under the several colleges.*

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*See pp. 52, 67, 69, 71, 74, 77, 79, 89, 90, 93, 99, 103, 114, 121, 128.

ADMINISTRATION OF THE UNIVERSITY

GOVERNMENT

The government of the University is vested by the Trustees primarily in the President of the University, in the Faculty, in the Council of Administration, and in the Deans.

The dean of the general Faculty has general oversight of the instructional work of the University, and especial supervision of the graduate school.

The dean of each college is responsible for the enforcement of all University regulations within his college.

The Council of Administration is composed of the President, the dean of the general Faculty, and the deans of the separate colleges. It constitutes an advisory board to the President, *and has exclusive jurisdiction over all matters of discipline.*

The determination of the general internal policy of the University is in the hands of the Faculty.

The Faculties of the different colleges of the University have jurisdiction over matters pertaining exclusively to their colleges, subject always to higher University authority.

ORGANIZATION

For the purpose of more efficient administration, the University is divided into several colleges. This division does not imply that the colleges are educationally distinct. They are interdependent and together form a unit. The organization is as follows:

I. The College of Literature and Arts.

II. The College of Engineering.
III. The College of Science.
IV. The College of Agriculture.
V. The Graduate School.
VI. The School of Pharmacy.

THE COLLEGE OF LITERATURE AND ARTS

The College of Literature and Arts offers—

1. General courses, classified according to the principal line of work chosen.

2. Specialized courses, or courses under the group system, including—

a. The Classical Group.
b. The English and Modern Language Group.
c. The Philosophical Group.
d. The Political Science Group.

THE COLLEGE OF ENGINEERING

The College of Engineering offers courses—

1. In Architecture.
2. In Architectural Engineering.
3. In Civil Engineering.
4. In Electrical Engineering.
5. In Mechanical Engineering.
6. In Municipal and Sanitary Engineering.

THE COLLEGE OF SCIENCE

The College of Science offers courses arranged in four groups, as follows:

1. The Chemical Group.
2. The Mathematical Group.
3. The Natural Science Group.
4. The Philosophical Group.

THE COLLEGE OF AGRICULTURE

The College of Agriculture offers—

1. A course leading to Animal Husbandry as a specialty.
2. A course leading to Horticulture as a specialty.

THE GRADUATE SCHOOL

The Graduate School offers courses in—

1. Agriculture.
2. Engineering.
3. Literature, Philosophy, and the Arts.
4. The Sciences.

An enumeration of the departments of graduate study is given on page 129, and the separate courses offered are described in connection with the proper subjects in the description of departments, pp. 129ff.

THE SCHOOL OF PHARMACY

[See page 127.]

COLLEGE OF LITERATURE AND ARTS

FACULTY

Andrew S. Draper, LL.D., President.
David Kinley, Ph.D., Dean, Economics and Sociology.
Thomas J. Burrill, Ph.D., LL.D., Botany.
Samuel W. Shattuck, C.E., Mathematics.
Edward Snyder, A.M., German.
Charles W. Rolfe, M.S., Geology.
Arthur W. Palmer, Sc.D., Chemistry.
Frank F. Frederick, Art and Design.
Herbert J. Barton, A.M., Latin.
Charles M. Moss, Ph.D., Greek.
Daniel K. Dodge, Ph.D., English.
Daniel H. Brush, Captain 17th Infantry, U. S. A., Military Science.
Arnold Tompkins, A.M., Pedagogy.
George W. Myers, M.L., Mathematics.
Henry E. Summers, B.S., Physiology.
Edgar J Townsend, Ph.M., Mathematics.
Evarts B. Greene, Ph.D., History.
Katharine Merrill, A.B., English.
William O. Krohn, Ph.D., Psychology.
Harry S. Grindley, Sc.D., Chemistry.
T. Arkle Clark, B.L., Rhetoric.
Herman S Piatt, A.M., Romance Languages.
Arthur H. Daniels, Ph.D., Secretary, Philosophy.
Percy F. Bicknell, A.M., Librarian.
George D. Fairfield, A.M., Romance Languages.
Charles W. Tooke, A.M., Political Science.
Walter Howe Jones, Music.
Henry H. Everett, Physical Training.
George D. Hammond, A.B., History.
Fred A. Sager, B.S., Physics.
Frank Smith, A.M., Zoölogy.

Ralph P. Smith, Ph.D., German.
Helen E. Butterfield, M.L., Rhetoric.
Alton C. Burnham, B.S., Mathematics.
Jeremiah. G. Mosier, B.S., Geology.
Charles F. Hottes, M.S., Botany.
Edward J. Lake, B.S., Art and Design.
Ella H. Morrison, Physical Culture for Women.
George A. Huff, Jr., Coach of Athletic Teams.
Marion Thompson, B.L., Fellow, Rhetoric.
William LaB. Steele, Scholarship in Music.
Adeline W. Rowley, B.M., Vocal Music.
Robert K. Porter, Military.

AIMS AND SCOPE

The College of Literature and Arts includes those branches usually comprised in a department of philosophy and arts, with the exception of the natural sciences. The aim of the college is a double one: to furnish a liberal education, and to afford the largest opportunity for specialization in literary and philosophical subjects. It is believed that this double purpose can be best accomplished by a judicious combination of disciplinary and information studies, which, while so directing the work of the student as to secure the desired mental training, shall also allow him large liberty of choice both in his main lines of work and in subjects auxiliary thereto.

In accordance with this general plan, it is provided that students may graduate either under the general course system or under the specialized course, or group, system.

A general course is one in which less than three years' work in any one line is required for graduation, and in which no thesis is required.

A specialized, or group, course is one containing at least two years of major work in a single subject preceding the senior year, followed by an additional year of major work in that subject, and the writing of an acceptable thesis. No student may be enrolled in a specialized course without the permission of the head of the department in which he wishes to do his principal work, and each student who wishes to be so enrolled must specify the course he desires to enter not later than the beginning of his junior year.

Only those students who pursue a specialized course shall, as a rule, be selected from this college for fellowships, scholarships, and other similar University honors.

THE GENERAL COURSE SYSTEM

In the general courses a minimum of prescribed work is laid out for the first two years. The whole of the work for the first year, and part of that of the second, is prescribed. The work for the rest of the course is elective. Within the limits of the prescribed work, moreover, the student is permitted a choice of lines of work.

In choosing his electives, each student must select at least two subjects from list A, as majors.

In the choice of his electives other than his major work the student may take a minimum of work in a maximum number of subjects, or he may take a maximum amount of work in the minimum number of subjects necessary to fill up his time according to the rules of the University.

The elective courses open to the students of the College include subjects from the Colleges of Agriculture, Science, and Engineering. The sciences are not an integral part of the work of this College, but the training derived from their study is so important a part of a liberal education that every student of the College is earnestly advised to extend his study of them so far as may be.

THE SPECIALIZED COURSE, OR GROUP, SYSTEM

In the specialized course, or group, system the prescribed work is the same as in the general courses. The other credits necessary for graduation are to be obtained in the subjects of the group which the student enters. (See requirements for graduation, below.) The groups are as follows:

The *Classical Group*, including Greek and Latin as the major subjects.

The *English and Modern Language Group*, including English, French, German, Italian, and Spanish. At present Italian and Spanish may not be chosen as major subjects.

The *Philosophical Group*, including Pedagogy, Philosophy and Psychology as major subjects. In this group the

second year of the student's work is devoted to studies specifically preparatory to the principal subject, which is itself taken up at the beginning of the third year.

Students in this group who make Philosophy a major must, in the second year, make three full term-credits from among these subjects: Anthropology, Psychology, Economics 6 (Sociology), Greek 5.

Those who make Psychology their major subject must, in their second year, make three full term-credits from among these subjects: Botany 1, b. c.; Economics 6; Philosophy 1, 8; Physiology 1, 2; Zoölogy 3.

When Pedagogy is the major the three second year credits must be obtained in Logic (Phil. 8) and two terms of Psychology.

The *Political Science Group*, including History, Economics, and Public Law and Administration. All students in this group must take the three elementary courses: History 1, Economics 1, and Political Science 1; and must also take at least one term's work in Philosophy, selected from courses 1, 2, 3, 4, and 8. All students in the group must, before the beginning of junior year, have taken one year's work in either French or German, or must give other satisfactory evidence of their ability to use freely at least one of these languages.

CLASSIFICATION OF SUBJECTS

PRESCRIBED

Advanced Algebra (Math. 1, 2) 1 credit.
English 1; 1 1-5 credits.
French 1, German 1, Greek 1, 2, 3, or Latin 1, 2, 3; 3 credits.
Geometry, Solid (Math. 19); 1 credit.
History 1; 1 4-5 credits.
Logic (Philosophy 8); 1 credit.
Military 1, 2; 2 credits.
*Natural Science; 3 credits.
Rhetoric 1; 2 credits.
Trigonometry (Math. 3, 4); 1 credit.

*The three credits required in science may be obtained by taking a single subject through the year, or by combining single-term minors.

ELECTIVE

List A (Major Courses)

Economics 1 to 8; 100; 6 to 14 credits.
English 1 to 14; 6 to 21 3-5 credits.
French 1 to 4; 6 to 12 credits.
German 1 to 4; 6 to 12 credits.
Greek 1 to 9; 6 to 9 credits.
History 1 to 12; 6 to 15 3-5 credits.
Latin 1 to 10; 6 to 10 credits.
Mathematics 1 to 19; 6 to 15 4-5 credits.
Pedagogy 1 to 9; 6 to 9 credits.
Philosophy 1 to 7, 9; 6 credits.
Political Science 1 to 9; 6 to 9 2-5 credits.
Psychology 1 to 9; 6 to 9 credits.
Rhetoric 1 to 4; 6 credits.

List B

Anthropology; 1 credit.
Art and Design 1 to 4, 7, 8, 9; 3 to 6 credits.
Astronomy 4; 1 credit.
Biology, General, 1, 2; 1 to 2 credits.
Botany 6; 1 to 4; 1 to 6 credits.
Chemistry 1, 2, 3a, 3b, 4, 5, 7, 9, 10, 12, 20; 1 to 11 credits.
Economics 1 to 7; 2 to 10 3-5 credits.
English 2 to 14; 3-5 to 20 2-5 credits.
French 1 to 4, 5; 3 to 12 credits.
Geology 4; 1; 1 or 3 credits.
German 1 to 4, 5, 6; 3 to 12 credits.
Greek 1 to 9; 3 to 9 credits.
History 2 to 12; 1 1-5 to 13 4-5 credits.
Italian 1; 3 credits.
Latin 1 to 10; 3 to 10 credits.
Mathematics 5 to 18; 1 to 12 4-5 credits.
Meteorology 1; 2-5 credits.
Mineralogy 1, 2; 3 credits.
Music 1, 2; 2 credits.
Paleontology, 2 credits.
Pedagogy 1 to 9; 1 to 9 credits.
Philosophy 1 to 7, 9; 2-5 to 6 credits.

Physiology 4, 1, 2; 1, 2 or 5 credits.
Physical Culture for Women, 1; 1 to 4 credits.
Physics 2; 1, 3 to 7; 1 to 11 credits.
Political Science 1 to 9; 2-5 to 9 2-5 credits.
Psychology 1 to 9; 1 to 9 credits.
Rhetoric 3, 4; 1 to 4 credits.
Spanish 1; 3 credits.
Zoölogy 1 to 6, 10, 11; 2 to 11 credits.

REQUIREMENTS FOR GRADUATION

Under the General Course System

Forty full term-credits, including Military, are required for graduation under the general-course system. Every student must take the prescribed subjects; in addition, he must select at least two subjects from list A. He must then choose from lists A and B work which will give him the remainder of his necessary credits.

No credits will be granted in any subject in either list except according to the enumeration given. For example, if work is offered in a subject for from three to six credits, no credit will be allowed for less than three terms' work.

Under the Specialized Course, or Group, System

Forty full term-credits, including Military, together with an acceptable thesis, are required for graduation under the group system. Every student must take the prescribed subjects. In addition he must, not later than the beginning of his junior year, specify the group in which he wishes to graduate. He must at this time select one subject in the group as his major subject, the study of which, alone or with the subjects designated as specifically preparatory* to it, he must pursue during the remaining two years, securing therein at least nine full term-credits. He must also select, with the approval of the head of the department in which his major subject lies, a sufficient number of other studies to yield him the necessary complement of credits, and he must present an acceptable thesis.

The thesis required for graduation must be on a topic

* See p. 50.

connected with the student's major study. It must present the results of investigation made under the immediate supervision of the instructor during the last year of the student's course. This work of investigation shall be the required work in the major subject, in whole or in part, during that year, and shall receive credit like any other study. Separate credit will not be given for the thesis.

No credit will be allowed in any subject except according to the enumeration given, and the same work shall not be credited both as major and minor work.

The only degree given in this college is that of A. B.

The prescribed studies must be taken in the term and year indicated in the outline of courses by years and terms.

In Music

Students in the department of Music may receive a certificate of graduation by complying with the following conditions:

Students of the piano or organ must complete the entire course specified for these instruments; must also complete the work offered in harmony, covering four terms, and must take one year's work (3 credits) in either German or French.

Students of the voice must complete the entire course offered in vocal work, the four terms' work in harmony, and one year's work on the piano, besides taking one year (3 credits) of German or French, and one year (3 credits) of Italian.

Students expecting to graduate in any of the above courses in music must also pass a satisfactory examination in the History of Music, and must write a thesis on some musical subject.

Students enrolled in the department of music only, pay no term fees, but must pay the music fees described on p. 239.

COURSES OF INSTRUCTION BY YEARS AND TERMS

The following statement gives the years and terms in which the prescribed subjects must be taken. Students in the general courses who take Greek *and* Latin may omit the science required.

FIRST YEAR

1. Advanced Algebra (Math. 1, 2); French 1, 5*, German 1, 5*, Greek 1, or Latin 1; Military 1, 2; Natural Science: Chemistry 1; Zoölogy 10, 11; Rhetoric 1.

2. French 1, 5*, German 1, 5*, Greek 2, or Latin 2; Military 1, 2; Natural Science: Biology 1, Chemistry 2, 3a, Geology 4, Physics 2, or Zoölogy 1, 2, 3; Rhetoric 1; Trigonometry (Math. 3, 4).

3. French 1, 5*, German, 1, 5*, Greek 3, or Latin 3; Geometry, Solid (Math. 19); Military 2; Natural Science: Astronomy 4, Biology 2, Botany 6, Chemistry 2, 3b, 4, 20, or Zoölogy 1, 2; Rhetoric 1.

SECOND YEAR

1. English 1; History 1; Military 2; Electives.
2. English 1; History 1; Military 2; Electives.
3. English 1; History 1; Logic (Philos. 8); Military 2; Electives.

The studies of the third and fourth years are all elective.

DESCRIPTION OF DEPARTMENTS

Art and Design

This work subserves a threefold purpose: (1) It affords students the opportunity to acquire such a knowledge of free-hand drawing as their chosen courses may require. (2) It offers to such as have a talent or taste for art the best facilities for pursuing studies in all branches of fine art. (3) It offers to those who wish to become teachers of drawing special opportunities for study.

In all courses the work is made of direct benefit to students in other lines, and at the same time it aims to develop in them a love and an appreciation of the beautiful.

Special students, not otherwise connected with the University, may enter this department upon payment of moderate fees. For such students a fourth year of work is offered in drawing, painting, modeling, or design, as they may elect.

Lectures are given each year on lettering, design, historic ornament, perspective, and the theory of color. Students are required to submit one or more plates in each subject.

* Students in the College of Literature and Arts are permitted to take the scientific French and German if they are pursuing major work in Economics, Mathematics, Pedagogy, Philosophy, or Psychology.

ECONOMICS

The study of economics by undergraduates may extend through three years. The work is so arranged that the student can take a continuous course for from one to three years. The introductory courses are repeated each year, and the advanced courses are divided into two groups and given in alternate years. Text-books are used in the introductory courses, but only as guides. The assigned readings are designed to cover as large a field as possible in the literature of the subject, to present all disputed matters from different points of view, and are supplemented by discussions and lectures. Educational development, acquaintance with the subject, and training for good citizenship are ends kept steadily in view.

Minor courses in sociology are provided for in the department.

ENGLISH LANGUAGE AND LITERATURE

The courses are designed to give a continuous view of the twofold subject from the earliest times to our own day. In the junior and senior years double courses are offered, so that students, having had the fundamental work of the sophomore year, may, if desired, confine themselves either to philology or to literature. The aim in the study of literature is to approach the works of an author from the philosophical, emotional, and esthetic, as well as from the merely linguistic and historical, points of view.

FRENCH

(See Romance Languages, p. 61.)

GERMAN

Four years of instruction are offered in this subject. The first year's class is taught in two divisions: one comprised of students whose purpose is to acquire a knowledge of German literature; the other of those who wish merely a reading knowledge of the language for scientific or technical purposes. The methods of instruction in each division are adapted to the ultimate aims of the study.

The work of the second year is carried on according to the same plan. Course 2 offers a full year of readings in classic

and modern German and composition; course 6 offers two terms of scientific and technical reading. The students are arranged in groups and classes, so as to give each practice in reading in his own special line.

The third year's work consists of the critical study of the classic poets, rapid reading of modern writers, composition, conversation, and lectures on Modern German Literature.

The work of the fourth year is the elementary study of Gothic, Old and Middle High German, and the further study of German Literature. Lectures and instruction are given in German.

Greek

The general purposes of the courses laid out in this subject are: first, to teach the Greek language; second, to train students to appreciate its literature; and third, to call attention to those numerous problems in the history, thought, and institutions of the Greeks which illustrate similar phenomena noticeable among ourselves. To accomplish the first object, due attention is paid to the principles of grammar, particularly by making the syntax appear as the evidence of orderly mental procedure, and by continual practice in extemporaneous translation. The second is effected by a study of the surroundings and spirit of an author, and of those literary devices which give character to his productions. The third end is reached through familiar talks upon suitable topics as they are met.

In courses 7 and 8 a more mature line of work is contemplated, for which courses 1 to 6 are a graded preparation. A prominent feature of this work is the investigation by students of topics requiring the gathering and systematizing of material relating thereto. Ample library and other appliances are provided. Course 9 is more general, but is expected to articulate, for classical students, with courses 1–8, and to supply a consistent outline of the history of the institutional life of the Greeks.

History

The work of this department begins with an elementary course, prescribed for sophomores, in the history of mediæval and modern Europe. The advanced undergraduate work falls into two main divisions, mediæval history and modern history. The undergraduate courses are, finally, followed in each

division by the seminary. These historical seminaries are designed for seniors of high standing, who have had the requisite preliminary training, and for graduates.

Throughout these courses the effort is made not merely to give students a general knowledge of historical facts, but also to give them some conception of the aims and methods of historical science, and of the materials with which it deals. To this end exercises in historical investigation, more or less elementary, will form a prominent part of the work in all the higher undergraduate courses, as well as in the seminaries.

Italian

(See Romance Languages, p. 61.)

Latin

The courses at present offered in Latin are ten in number and extend over three years. It is recognized that many students are deficient in preparation and need rigid drill in noun and verb syntax, while there are few to whom this drill is not beneficial. With this thought, the first term's instruction is, as far as needed, grammatical, prominence being given to Latin writing as the best method of acquiring a mastery of the language.

Ability to read Latin in the Latin order is strenuously insisted on, as inability in this particular is one of the chief reasons for the small results that many students secure.

As soon as this preliminary work is done, the attention is directed to two ends. The first is the acquisition of a constantly increasing power to read the language with ease and pleasure. As large a number as possible of representative authors are read. The thought is constantly emphasized that students are not simply reading Latin; they are reading some of the great literary masterpieces of the world, and should enjoy them as such. The second aim is to introduce the student to the daily life of the Roman; to make his home life vivid, his political life a reality. The contribution of the Roman world to the language, literature, and institutions of our time is so great that an intimate acquaintance with that life is of the highest educational value.

The courses offered include a teachers' class. The work is based on the needs of those teaching preparatory Latin, and

methods of presentation, difficulties, aims, and results are discussed. The members of the class do the work that they, as teachers, should require of their pupils, and at intervals take charge of the recitation.

The Latin department is amply supplied with all necessary appliances for the successful prosecution of the work.

Mathematics

The object of the instruction in pure Mathematics is to promote habits of mental concentration and continuity of thought, to develop the capacity to form and combine abstract conceptions, and to cultivate deductive reasoning. The course is so arranged as to meet the requirements of those who wish to fit themselves for instructors, and of those who study the science for the love of it.

Parallel with the pure mathematics of the junior and senior years, two lines of associated work in applied mathematics—physical and astronomical—are offered, either of which may be, and one of which must be, taken by the student wishing to make mathematics his leading course. One of these lines leads from the physics of the sophomore year through the mathematical theory of electricity and magnetism, heat, light, and sound; and the other through surveying and mechanics to celestial mechanics and to general and mathematical astronomy.

For fuller information, see p. 97.

Military Science

(See p.234.)

Music

The department of Music, during the past year, has been entirely reorganized, and offers superior advantages to those desiring a thorough musical education. The courses offered are widely varied, and are arranged to meet the individual needs of students. The time that may be devoted to the subject, especially in the study of an instrument or the voice, is indefinite; however, a regular course is laid out which can be completed by any student of average ability within the period indicated.

The courses in music lead to graduation from the music department with a diploma showing the amount of work

accomplished by the student. The course in the history of music may be taken for credit by students in the College of Literature and Arts according to the conditions specified under "Music" in the description of courses.

In addition to these opportunities the students are privileged to hear good music interpreted by artists of recognized ability. A course of Artists' Concerts is given each season under the management of the department of music. In these concerts, to which an admission fee is charged, only artists of the best reputation appear.

The instructors in the department of music give free recitals and lectures on musical subjects during the year.

Pedagogy

Pedagogy is not only a professional, but a culture study. We cannot escape educating ourselves. The question is only whether we shall educate ourselves well or ill. In the list of courses offered, accordingly, neither logical nor moral training nor the philosophical foundations of pedagogy have been omitted, and the point of view taken throughout is the highest known in the pedagogical field—the Herbartian. The course is broadened to meet the needs, not only of intending teachers, but of all University students.

Philosophy

The work in this department includes History of Philosophy, Metaphysics, Ethics, and Logic, and is so arranged that the student may take a continuous course for either one or two years.

The courses are planned to meet the needs of those who make philosophy their specialty, and also of those who desire an acquaintance with the subject as a means of general culture. It is the constant aim to emphasize the meaning and interest of philosophy and the relations of its problems to the life of man. The subjects are taught by lectures, recitations, and the seminary method.

Physical Culture for Women

Each student who takes physical instruction is expected to undergo a physical examination at the beginning and end of

every year, in order that her physical condition may be known and suitable exercises and advice given. Systematic class work is given in the use of dumb-bells, wands, bar-bells, foils, Indian clubs, and on all pieces of gymnastic apparatus.

During the fall and spring terms, outdoor games and exercises receive considerable attention; during the winter term, indoor games and athletic work are made interesting by public entertainments and contests. Lectures and talks on hygiene, physical training, etc., are given during the winter term.

Special attention is given to the correction of those inequalities of hips, shoulders, and vertebræ which prevent the harmonious development of the body. Each student comes under the personal observation of the director and is given exercises to meet her special needs.

A special gymnasium is fitted up for women.

Every woman student not physically disqualified may take this work. If taken for credit, the conditions laid down under Physical Culture in the description of courses must be complied with.

Political Science

The courses in Political Science are planned with two purposes in view: (1) to give, in conjunction with the instruction in Economics and History, that information and training which are requisite to intelligent citizenship; and (2) to afford opportunities for advanced work to those who may desire more thorough preparation either for active political life, or preliminary to the study of law.

To meet these ends, the work is so arranged that the subject may be pursued continuously for three years. The elementary courses are given every year, while the advanced courses offered in alternate years are made to correlate in accordance with the general scheme. The topics for special investigation in the seminary course will be selected with a view to supplement the advanced work of the year.

The courses, as a whole, are intended to cover the theory of the state, its organization, and practical operation. Attention is paid to the development of political ideas and to the growth of national institutions. The comparative method is followed, wherever practicable. Freedom of discussion is encouraged in the class room, and the student is stimulated to original investigation and to independent thinking.

Psychology

The aim of this department is to acquaint the student with the manifestations of mind, and the laws according to which it develops. In pursuance of this purpose the elements of mentality as exhibited in the various animals and in early infant life are carefully investigated. The mental make-up of the defective and criminal classes is also inquired into in order that light may be thrown upon the best methods to be employed in the treatment of these classes—the best education for the defective, and the best environment for the criminal.

Special attention is given to scientific methods of child study because of the direct and important relations in which the results of such study stand to the various pedagogical theories and to the estimate of the educational value of the different subjects taught in our common schools.

Rhetoric

The courses at present offered in Rhetoric are four, and extend over two years and one term. The object of the courses is not only to acquaint the student with the principles of rhetoric, but to teach him correctness and effectiveness in the use of English. In the first year's work a text-book is used, supplemented with lectures and a critical discussion of the written exercises. About thirty short themes and two long papers a term are required from each student. More emphasis is put upon practice than upon theory.

The second year's work is a daily theme course, and is intended to give practice in higher English composition and criticism.

A one-term course is offered in the theory and practice of argumentative discourse.

Romance Languages and Literatures

This department offers four years of instruction in French and one year each in Spanish and Italian. In the elementary courses the main object is to give the student correct pronunciation, grammatical knowledge, and the ability to read the languages with facility. In French 2, attention is especially directed to various phases of nineteenth century literature; effort is made to ground the student thoroughly in the modern

idiom, and lectures are given upon the outlines of French literature in general. French 3 makes a special study of the masterpieces of the seventeenth century. Ability to understand readily spoken French is requisite for admission to this course. The subject of French 4 is literature and society in the eighteenth century. A graduate course is offered in Old French; some of the more important texts are studied, and attention is given to the origins of the language.

Sociology

(See Economics, p. 55.)

Spanish

(See Romance Languages.)

COLLEGE OF ENGINEERING

FACULTY

Andrew S. Draper, LL.D., President.
N. Clifford Ricker, M.Arch., Dean, Architecture.
Thomas J. Burrill, Ph.D., Botany.
Samuel W. Shattuck, C.E., Mathematics.
Ira O. Baker, C.E., Civil Engineering.
Charles W. Rolfe, M.S., Geology.
Arthur N. Talbot, C.E., Municipal and Sanitary Engineering; Mechanics.
Arthur W. Palmer, Sc.D., Chemistry.
Frank F. Frederick, Art and Design.
Samuel W. Parr, M.S., Applied Chemistry.
Daniel K. Dodge, Ph.D., English Language and Literature.
Lester P. Breckenridge, Ph.B., Mechanical Engineering.
Daniel H. Brush, Captain U. S. A., Military Science.
George W. Myers, M.L., Mathematics.
Edgar J Townsend, Ph.M., Mathematics.
Katharine Merrill, A.B., English.
James M. White, B.S., Architecture.
William H. VanDervoort, M.E., Mechanical Engineering.
William D. Pence, C.E., Secretary, Civil Engineering.
T. Arkle Clark, B.L., Rhetoric.
Herman S Piatt, A.M., French.
Bernard V. Swenson, B.S., Electrical Engineering.
Fred A. Sager, B.S., Physics.
William Esty, A.M., Electrical Engineering.
Cyrus D. McLane, B.S., Architecture; Mechanics.
James D. Philips, B.S., General Engineering Drawing.
Ralph P. Smith, Ph.B., German.
Helen E. Butterfield, M.L., Rhetoric.

Alton C. Burnham, B.S., Mathematics.
Robert A. Wood, M.E., Mechanical Engineering.
George A. Goodenough, B.S., Mechanical Engineering.
Oscar Quick, A.B., Physics.
Burton E. Moore, A.M., Physics.
Arthur L. Almy, M.E. Electrical Engineering.
Cyril B. Clark, Machine Shops.
Charles A. Gunn, B.S., Architecture.
Albert R. Curtiss, Mechanical Wood Shops and Foundry.
Henry Jones, Forge Shops.
Robert C. Vial, B.S., General Engineering Drawing.
Edward J. Lake, Art and Design.
Milo S. Ketchum, B.S., Civil Engineering.
Paul Chipman, B.S., Testing Laboratory.
Joseph H. Wilson, Foundry.
R. K. Porter, Military.

AIMS AND SCOPE.

The purpose of the College of Engineering is thoroughly to educate engineers and architects for their future professional courses. Its aim is therefore twofold—general and technical. A considerable proportion of the course of study is devoted to general and literary work, since a graduate is expected now to arrange his ideas in clear order, and to write or speak effectively. Professional success depends upon this power far more than is commonly supposed.

There is an ever increasing fund of general and scientific knowledge with which every educated man is expected to be conversant, if he desires to retain the esteem of his associates and clients. Scarcely a science is not at some time useful to the engineer, and some of them, like mathematics or physics, are so intimately interwoven with the different branches of technical knowledge, as to be practically indispensable. Much of the most valuable material of these sciences is yet locked up in foreign languages, and they must be acquired by patient study and practice.

It might appear that this general training would be sufficient to absorb the entire attention of the student during his whole course, but not less than one-half his time must be given to purely technical training, and to the acquirement of a

professional capital, or stock of information and knowledge of details.

The methods employed for embodying new ideas in drawings, intelligible to other professional men and to mechanics, must likewise be acquired.

Engineering knowledge must be fresh to be valuable, since ideas and methods are quickly supplanted by improved ones, and become useless except as mile-stones of progress. Consequently the most valuable part of this professional knowledge can never be crystalized in text-books, but must be drawn from the mental stores of the instructor.

METHODS OF INSTRUCTION

Whenever suitable text-books can be found, they are employed because their use saves much time in acquiring facts and data, and because such books become doubly valuable for later reference, when enriched by notes and additions. But to arouse and to awaken the enthusiasm of the student, discussions and formal lectures are necessary, and they must be fully illustrated by sketches, diagrams, drawings, and photographs of executed work. These are frequently used in the advanced classes, partly because the deficiency of text-books is there greatest. Additional courses of extended reading are indicated by references to the University library, so that each student may enjoy the greatest possible benefit from the course of instruction. In all courses of study offered by this College, drawing, in its manifold forms and uses, is made a special feature, both in its application and its modes of execution.

EQUIPMENT

The equipment of the various departments is described under the appropriate heads. In addition to what is there mentioned the College owns some valuable apparatus of a general character. The most important part of this consists of a collection of machines and apparatus for abbreviating computations, and especially for use in the calculation of tables. The principal instruments are described below:

(1) A Thomas ten-place arithmometer, the largest size manufactured, imported especially for the University, and

giving products of numbers to twenty places. (2) Two Thacher's computing scales, especially accurate, for performing multiplication, division, squaring, and the extraction of square root. (3) An Amsler's polar planimeter for measuring the area of figures of any form, and employed principally in graphic statics or in measuring indicator diagrams. (4) A Coradi's rolling planimeter of largest size and a Coradi's polar planimeter for more accurate use. (5) An Amsler's integrator for obtaining area, static moment, and moment of inertia of plane figures, especially of sections of columns, beams, etc. (6) A Coradi's pantagraph of best construction for the reduction of drawings and maps. (7) Various computing machines, including Boucher's calculator, Ram's slide rules, duplex slide rule, Webb's adder, the ribbon adder, etc.

DESCRIPTION OF DEPARTMENTS

ARCHITECTURE

The department of architecture and architectural engineering occupies nearly the entire upper story of Engineering Hall, thereby securing drawing rooms lighted by skylights, convenient class rooms, cabinet, museum, and studies.

Instruction

The course of study in architecture prepares graduates for professional work as architects, draftsmen, and superintendents of construction. The scientific principles of construction and its practical details, drawing applied to all purposes, the principles of design and their application to the planning and designing of buildings, are therefore made especially prominent in the course of instruction. Great attention is also devoted to the history and esthetics of architecture.

Instruction is imparted by means of text-books, when suitable works exist, by the solution of numerous problems, by blueprint lecture notes and syllabuses, and by constant practice in original design whenever this can be employed. The collection of plates in the architectural cabinet, with models, sketches, and working drawings are used as illustrations and suggestions.

Drawing and designing are practised throughout the entire course, and two years of instruction are provided in

free-hand drawing, modeling, water colors, industrial design, and sketching from nature.

Equipment

A large collection of casts of ornament from Spain and from Germany are jointly used by the departments of architecture and of art. Models of ceilings, roof trusses, stairs, joints in woodwork, with a large number of specimens of stone, terra cotta, moulded bricks, etc., are among the architectural collections, together with an interesting group of Norwegian, Indian, and Japanese art works. A series of working drawings of buildings designed by noted architects is placed in the architectural cabinet for convenient reference.

A fine collection of 17,000 engravings, photographs, and photoprints, mounted on cards eleven by fourteen inches, is placed in the drawing rooms, classified according to the Dewey decimal system, for use in construction, history of architecture, and designing, and forms a most valuable working library for draftsmen and designers.

An electric-arc lantern is permanently placed in a special lecture room with stepped floor. For use with it, there are 2,200 lantern slides illustrating the history of architecture, especially Richardson's best work, and American houses and club houses.

A good number of the latest and best American, English, French, and German architectural works is to be found in the library of the University.

Apparatus is provided for surveying, for making tests in heating and ventilation, and for making photographs and lantern slides.

The department also possesses a large collection of working drawings from the offices of noted architects of residences, offices, United States buildings, and especially of the more important structures of the World's Columbian Exposition.

Course of Instruction

Required for Degree of B. S. in Architecture

FIRST YEAR

1. Advanced Algebra (Math. 2); Elements of Drafting (Drawing, Gen. Eng'g 1, 4); Free-Hand Drawing or Model-

ing (Arch. 20 or 21); French 5, or German 5, or English 1, 2; Military 1, 2.

2. Trigonometry (Math. 4); Descriptive Geometry (Drawing, Gen. Eng'g 2); Free-Hand Drawing or Water Color (Arch. 20 or 21); French 5, or German 5, or English 1, 2; Military 1, 2.

3. Analytical Geometry (Math. 6); Descriptive Geometry (Drawing, Gen. Eng'g 2, 3); Architectural Drawing (Arch. 8); French 5, or German 5, or English 1, 2; Military 2.

SECOND YEAR

1. Applied Mechanics (Theo. and App. Mech. 4); Wood Construction (Arch. 2); Physics 1, 3; Architectural Drawing (Arch. 9); Rhetoric 2; Military 2.

2. Strength of Materials (Theo. and App. Mech. 5); Stone, Brick, and Metal Construction (Arch. 3); Physics 1, 3; Architectural Drawing (Arch. 9); Rhetoric 2; Military 2.

3. Sanitary Construction (Arch. 4); Free-Hand Drawing or Sketching (Arch. 20 or 21); Physics 1, 3; Architectural Drawing (Arch. 9); Rhetoric 2; Military 2.

THIRD YEAR

1. History of Architecture (Arch. 6); Architectural Seminary (Arch. 11); Architectural Designing (Arch. 16); Chemistry 1; Architectural Drawing (Arch. 9).

2. History of Architecture (Arch. 6); Architectural Seminary (Arch. 11); Architectural Perspective (Arch. 14); Requirements and Planning of Buildings (Arch. 15); Architectural Drawing (Arch. 9).

3. History of Architecture (Arch. 7); Architectural Seminary (Arch. 11); Roofs (Arch. 5); Esthetics of Architecture (Arch. 18); Architectural Drawing (Arch. 9).

FOURTH YEAR

1. Heating and Ventilation (Arch. 13); Architectural Designing (Arch. 17); Renaissance Design (Arch. 22); Thesis.

2. Superintendence, Estimates, and Specifications (Arch. 12); Gothic Design (Arch. 23); Romanesque Design (Arch. 24)*; Thesis.

*A second term in Arch. 22 will be accepted in lieu of Arch. 23 or Arch. 24.

3. Surveying (Civil Eng'g 10); Composition of Ornament (Arch. 25); Thesis.

ARCHITECTURAL ENGINEERING

This course of study prepares graduates for professional employment as architects, structural designers, and computers, as well as superintendents of construction. It is intended for students who prefer the structural and mathematical side of the profession to its artistic side, and who desire to pursue the full engineering course in mathematics, and to acquire a thorough knowledge of the iron and steel construction now employed in buildings. It differs from the architectural course principally in the addition of a second year of mathematics; in the substitution of a year of civil engineering study in masonry design, bridge analysis and design, for the year of freehand drawing, and in the devotion of considerably less time to architectural drawing and designing.

Course of Instruction

Required for Degree of B. S. in Architectural Engineering

FIRST YEAR

1. Advanced Algebra (Math. 2); Elements of Drafting and Sketching (Drawing, Gen. Eng'g 1 and 4); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1 and 2; Military 1, 2.

2. Trigonometry (Math. 4); Descriptive Geometry (Drawing, Gen. Eng'g 2); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1 and 2; Military 1, 2.

3. Analytical Geometry (Math. 6); Descriptive Geometry and Lettering (Drawing, Gen. Eng'g 2 and 3); Architectural Drawing (Arch 8); French 5, or German 5, or English 1, 2; Military 2.

SECOND YEAR

1. Differential Calculus (Math. 7); Wood Construction (Arch. 2); Physics 1, 2; Architectural Drawing (Arch. 9); Rhetoric 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); Stone, Brick, and Metal Construction (Arch. 3); Physics 1 and 3; Architectural Drawing (Arch. 9); Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9); Sanitary Construction (Arch. 4); Physics 1 and 3; Architectural Drawing (Arch 9); Rhetoric 2; Military 2.

THIRD YEAR

1. Analytical Mechanics (Theo. and Appl'd Mech. 1); History of Architecture (Arch. 6); Architectural Drawing (Arch. 9); Architectural Seminary (Arch. 11); Chemistry 1.

2. Resistance of Materials (Theo. and Appl'd Mech. 2); History of Architecture (Arch. 6); Architectural Drawing (Arch. 9); Architectural Seminary (Arch. 11); Chemistry 16.

3. Hydraulics (Theo. and Appl'd Mech. 3); Roofs (Arch. 5); Dynamo-Electric Machinery (Elect. Eng'g 2); Architectural Drawing (Arch. 9).

FOURTH YEAR

1. Masonry Construction (Civil Eng'g 5); Architectural Designing (Arch. 16); Heating and Ventilation (Arch. 13); Thesis.

2. Bridge Analysis (Civil Eng'g 8); Superintendence, Estimates, and Specifications (Arch. 12); Thesis.

3. Bridge Design (Civil Eng'g 8); Surveying (Civil Eng'g 10); Architectural Engineering (Arch. 19); Thesis.

CIVIL ENGINEERING

The design in this department is to furnish a course of theoretical instruction, accompanied and illustrated by a large amount of practice, which will enable the student to enter intelligently upon the various and important duties of the civil engineer.

Instruction

While the instruction aims to be practical by giving the student information and practice directly applicable in his future professional work, the prime object is the development of the mental faculties. The power to acquire information and the ability to use it, is held to be of far greater value than any amount of so-called practical knowledge. The method of instruction consists in coupling the development of intellectual power with the acquisition of information directly useful to the civil engineer in his profession.

The instruction is given by lectures, text-books, and reading, to which are added numerous problems and practical exercises, such as will best serve to explain principles completely and fix them in the mind. Models and instruments are continually used both in lectures and by the students.

Equipment

This department has an extensive equipment of compasses, engineer's transits, solar transits, levels—ordinary and precise—plane tables, barometers, etc. An Observatory is provided with the instruments necessary in determining latitude, time, and azimuth. The equipment includes two astronomical transits, a 10-inch altazimuth reading to seconds, two clocks, two chronographs, three chronometers, two sextants, and five isolated masonry piers. For the lecture room, the department is provided with full-size joints of an actual railroad bridge, sections of columns, eye-bars, etc., and a large collection of lithographs, photographs, and blue prints of bridges and buildings.

Course of Instruction

Required for the Degree of B. S. in Civil Engineering

FIRST YEAR

1. Advanced Algebra (Math. 2); Elements of Drafting and Sketching (Drawing, Gen. Eng'g 1 and 4); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1 and 2; Military 1 and 2.

2. Trigonometry (Math. 4); Descriptive Geometry (Drawing, Gen. Eng'g 2); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 1, 2.

3. Analytical Geometry (Math. 6); Descriptive Geometry and Lettering (Drawing, Gen. Eng'g 2 and 3); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 2.

SECOND YEAR

1. Differential Calculus (Math. 7); Land Surveying (Civil Eng'g 1); Physics 1 and 3; Rhetoric 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); Drawing and Surveying (Civil Eng'g 2 and 3); Physics 1 and 3; Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9); Drawing and Surveying (Civil Eng'g 2 and 3); Physics 1 and 3; Rhetoric 2; Military 2.

THIRD YEAR

1. Analytical Mechanics (Theo. and Appl'd Mech. 1); Railroad Engineering (Civil Eng'g 4); Chemistry 1.
2. Resistance of Materials (Theo. and Appl'd Mech. 2); Railroad Engineering (Civil Eng'g 4); Road Engineering (Municipal and San. Eng'g 1); Steam Engines and Boilers (Mech. Eng'g 6).
3. Hydraulics (Theo. and Appl'd Mech. 3); Descriptive Astronomy (Astronomy 2); Roofs (Arch. 5).

FOURTH YEAR

1. Masonry Construction (Civil Eng'g 5); Geodesy and Practical Astronomy (Civil Eng'g 6 and 7); Water-Supply Engineering (Mun. and San. Eng'g 2); Thesis.
2. Bridge Analysis (Civil Eng'g 8); Sewerage (Mun. and San. Eng'g 3);. Structural Details (Civil Eng'g 11); Thesis.
3. Bridge Designing (Civil Eng'g 8); Tunneling (Civil Eng'g 9); Geology 3; Thesis.

ELECTRICAL ENGINEERING

Instruction

This course is intended to give young men the best possible preparation for work in the practical applications of electricity. The instruction is given by lectures, laboratory practice, designing, and drafting. The student is encouraged to read the best periodical literature concerning the theory and the applications of electricity. By keeping himself informed as to the best efforts of others in every department of his profession, it is hoped that he may be stimulated to independent thought and original investigation in his own field. To this end, a department reading room, at all times accessible to students in this course, has been established, where the leading American, English, French, and German journals of theoretical and applied electricity are kept on file. The instructors and students meet weekly to discuss the leading articles in current numbers of these journals. A critical discussion of one or more papers is required of each senior twice a month.

Equipment

This department has quarters in Engineering Hall and in the basement of University Hall. The class rooms, drafting rooms, seminary rooms, studies, and offices are in Engineering Hall. The rooms devoted to laboratory practice are in University Hall, and include the electrical measurement laboratory, the dynamo laboratory, the battery room, the photometry room, and the work shop.

The electrical-measurements laboratory has masonry piers for the more sensitive instruments, and numerous conveniences indispensible to rapid and accurate measurements. In this laboratory the work relating to the measurement of current, resistance, electromotive force, the standardizing of measuring apparatus, etc., is carried on. This laboratory has been supplied with apparatus from the leading makers at home and abroad. There are several forms of bridges, resistance boxes, testing sets, non-inductive and continuously variable rheostats, and certified standards of resistance; the leading forms of galvanometers and reading devices; single and subdivided condensers, standard cells and electrostatic voltmeters; hot-wire instruments; electrodynamometers; current balances; watt-meters; ammeters and voltmeters for direct and alternating currents. Current is brought to this laboratory from the battery room and from the dynamo laboratory.

The dynamo laboratory is supplied with power from a sixty-horse-power steam engine, which is used exclusively for the experimental work of this department. In this laboratory are to be found the leading types of direct and alternating current dynamos and motors, with conveniences for making complete tests. The equipment includes a complete Thomson-Houston 300-light alternating-current lighting plant, a complete Thomson-Houston 3-light arc-lighting plant, a complete Brush 10-light arc-lighting plant, a complete Edison 100-light incandescent plant, a small 500-volt direct-current power plant, and a small single-phase alternating-current power plant.

The photometry room is fitted out with a complete electric-light photometer, numerous types of incandescent and of direct and alternating current arc-lamps, and conveniences necessary for making complete tests.

The battery room contains a large collection of primary cells and several large batteries of the more important kinds of accumulators with arrangements for efficiency tests.

The work shop is supplied with an engine lathe, a speed lathe, grinder, etc., and a line of fine tools suited to the manufacture of special apparatus. An electric motor furnishes power for this room.

Course of Instruction

Required for the Degree of B. S. in Electrical Engineering

FIRST YEAR

1. Advanced Algebra (Math. 2); Elements of Drafting and Sketching (Drawing, Gen. Eng'g 1 and 4); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 1, 2.

2. Trigonometry (Math. 4); Descriptive Geometry (Drawing, Gen. Eng'g 2); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 1, 2.

3. Analytical Geometry (Math. 6); Descriptive Geometry and Lettering (Drawing, Gen. Eng'g 2, 3); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 2.

SECOND YEAR

1. Differential Calculus (Math. 7); Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1 and 3; Rhetoric 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1 and 3; Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9); Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1 and 3; Rhetoric 2; Military 2.

THIRD YEAR

1. Analytical Mechanics (Theo. and Appl'd Mech. 1); Mechanism (Mech. Eng'g 5); Chemistry 1; Electrical Measurements (Physics 4).

2. Resistance of Materials (Theo. and Appl'd. Mech. 2); Steam Engines and Boilers (Mech. Eng'g 6); Chemistry 3a or 16; Electrical Measurements (Physics 4).

3. Hydraulics (Theo. and Appl'd Mech. 3); Chemistry 3b, or Surveying (Civil Eng'g 10); Mechanical Engineering Laboratory (Mech. Eng'g 3); Electrical Measurements (Physics 4); Elements of Dynamo Machinery (Elect. Eng'g 11).

FOURTH YEAR

1. Thermodynamics (Mech. Eng'g 7); Steam Engine Design and Valve Gears (Mech. Eng'g 11); Dynamo-Electric Machinery (Elect. Eng'g 3); Seminary (Elect. Eng'g 10); Thesis.

2. Alternating Currents and Alternating Current Machinery (Elect. Eng'g 4); Photometry (Elect. Eng'g 5); Electrical Communication (Elect. Eng'g 6); Electro-metallurgy (Elect. Eng'g 7); Seminary (Elect. Eng'g 10); Thesis.

3. Alternating Currents and Alternating Current Machinery (Elect. Eng'g 4); Lighting Plants (Elect. Eng'g 8); Electrical Transmission of Power (Elect. Eng'g 9); Seminary (Elect. Eng'g 10); Thesis.

MECHANICAL ENGINEERING

It is the object of this course to give the student a thorough training in the theoretical principles underlying the science of machines and mechanics, and at the same time to enable him to become practically familiar with some of the numerous applications of these principles.

Instruction

The methods of instruction vary with the subjects under consideration. It is the aim to keep the student interested in his work, with the belief that it is only under such a condition that he will receive the maximum benefit from his work. A practical course in drawing and designing extends through the entire course of study. Shop or laboratory practice is also a part of each term's work.

Equipment

The equipment of this department is arranged for work under three heads—class and drawing-room work, mechanical engineering laboratory work, and shop practice. The facilities for class and drawing-room work are unexcelled.

The *drawing rooms* are equipped with modern desks, boards, filing cabinets, card indexes, reference books, catalogues, odontographs, gear charts, tables, etc. In the cabinet rooms are kinematic models and sectioned steam specialties, many of which were donated by the manufacturers.

The *mechanical engineering laboratory* is in the Engineering Laboratory. It contains engines, boilers, pumps, a surface condenser, and a large assortment of indicators, gauges, scales, thermometers, dynamometers, calorimeters, reducing motions, planimeters, measuring tanks, and apparatus for the calibration of instruments. The engines may be run either with or without a condenser, with plain slide or expansion valves, or with automatic or throttling governors. Power is transmitted from the engines in this laboratory to the machine shop by a thirty-horse-power rope drive. Water is brought to the laboratory through a 2-inch main, furnishing a supply for condensers and boiler feed.

The heating and power plant of the University contains nine boilers: two Root, one Sterling, four horizontal tubular, and two Babcock & Wilcox, aggregating eight hundred-horse power. These furnish additional opportunity for experiment. Tests are also made at the power plants, pumping station, and factories of the two cities.

The machine shop, foundry, and forge shop are located in Machinery Building.

The *machine shop* contains one twenty-seven inch by twelve-foot bed F. E. Reed & Co. engine lathe; twelve engine lathes of from twelve to twenty-inch swing; two ten-inch speed lathes; one centering lathe; one fifteen-inch Gould and Eberhardt shaper; one fifteen-inch Hendey shaper; one No. 3 Brown and Sharpe plain milling machine; one Brainard universal milling machine; one twenty by twenty-inch by five-foot Putnam planer; one thirty by thirty-inch by eight-foot G. A. Gray & Co. planer; one No. 2 improved Brown and Sharpe universal grinding machine; one Brown and Sharpe cutter and reamer grinder; one twenty-four inch drill press; one twenty-inch drill press; one sensitive drill press; one water emery tool grinder; one center grinding machine; one Stover power hack saw; complete sets of United States standard taps and dies; drills,

arbors, reamers, gear and milling cutters, caliper gauges, calipers, scales, and other small tools.

The *wood shop* occupies the second floor of the Engineering Laboratory, and contains twenty-six improved woodworking benches, fourteen of which are fitted with Wyman and Gordon patent vises; one thirty-four-inch F. H. Clement and Co. band saw; one thirty-six-inch Yerkes and Finan band saw; one twenty-inch Clement and Co. wood planer; one J. A. Fay and Co. jig saw; one J. A. Fay and Co. jointer; eight ten-inch wood lathes; one eighteen-inch pattern-maker's lathe; one No. 4 E. Fox trimmer, together with a complete equipment of small tools.

The *foundry* occupies a room 48 by 48 feet in the Metal Shops, and is equipped with a twenty-four-inch Whiting patent cupola, a core oven, and the necessary sand, ladles, and flasks for making castings. A No. 7 Buffalo steel pressure fan furnishes blast for the cupola.

The *forge shop* occupies a room 36 by 48 feet in the Metal Shops, and contains ten latest improved Buffalo down-draft forges. Blast is furnished these forges by a No. 5 Sturtevant pressure blower, and all gases of combustion are exhausted under ground by means of a No. 9 Sturtevant exhaust fan. The shop is also equipped with all necessary small tools.

Course of Instruction

Required for the Degree of B. S. in Mechanical Engineering

FIRST YEAR

1. Advanced Algebra (Math. 2); Elements of Drafting and Sketching (Drawing, Gen. Eng'g 1 and 4); French 5, or German 5, or English 1 and 2; Shop Practice (Mech. Eng'g 1); Military 1, 2.

2. Trigonometry (Math. 4); Descriptive Geometry (Drawing, Gen. Eng'g 2); French 5, or German 5, or English 1 and 2; Shop Practice (Mech. Eng'g 1); Military 1, 2.

3. Analytical Geometry (Math. 6); Descriptive Geometry and Lettering (Drawing, Gen. Eng'g 2 and 3); French 5, or German 5, or English 1 and 2; Shop Practice (Mech. Eng'g 1); Military 2.

SECOND YEAR

1. Differential Calculus (Math. 7); Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1 and 3; Rhetoric 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1 and 3; Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9); Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1 and 3; Rhetoric 2; Military 2.

THIRD YEAR

1. Analytical Mechanics (Theo. and Appl'd Mech. 1); Mechanism (Mech. Eng'g 5); Chemistry 1; Shop Practice (Mech. Eng'g 3).

2. Resistance of Materials (Theo. and Appl'd Mech. 2); Steam Engines and Boilers (Mech. Eng'g 6); Chemistry 16; Shop Practice (Mech. Eng'g 3).

3. Hydraulics (Theo. and Appl'd Mech. 3); Dynamo-Electric Machinery (Elect. Eng'g 1); Surveying (Civil Eng'g 10); Mechanical Laboratory (Mech. Eng'g 3).

FOURTH YEAR

1. Thermodynamics (Mech. Eng'g 7); Steam Engine Design and Valve Gears (Mech. Eng'g 11); Mechanical Laboratory (Mech. Eng'g 12); Seminary; Thesis.

2. Mechanics of Machinery (Mech. Eng'g 8); Advanced Machine Design (Mech. Eng'g 9); Mechanical Laboratory (Mech. Eng'g 12); Seminary; Thesis.

3. Mechanics of Machinery (Mech. Eng'g 8); Original Designs (Mech. Eng'g 9); Estimates (Mech. Eng'g 10); Seminary; Thesis.

MUNICIPAL AND SANITARY ENGINEERING

This course is designed for students desiring to make a specialty of city engineering work. It prepares for the varied duties of engineer of the department of public works of cities and includes instruction in modern methods of sanitation of cities.

Instruction

Instruction is given by lectures, by text-book and seminary work, and by field, laboratory, and drafting work. The methods of training are intended to develop power to take up and solve new problems connected with municipal public works, as well as to design and to superintend the ordinary constructions. Surveying, structural materials, and structural design are taught as in the civil engineering course. The study of chemistry, botany, and bacteriology, so far as necessary to a comprehension of the questions involved in water supply and sewage disposal, are given. The facilities for this instruction are very good. The principles of the generation and transmission of electrical energy are given. Road engineering, water supply engineering, and sewerage receive special attention. A collection of drawings, plans, photographs, etc., has been added to the equipment.

Course of Instruction

Required for Degree of B. S. in Municipal and Sanitary Engineering

FIRST YEAR

1. Advanced Algebra (Math. 2); Elements of Drafting and Sketching (Drawing, Gen. Eng'g 1 and 4); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 1, 2.

2. Trigonometry (Math. 4); Descriptive Geometry (Drawing, Gen. Eng'g 2); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 1, 2.

3. Analytical Geometry (Math. 6); Descriptive Geometry and Lettering (Drawing, Gen. Eng'g 2 and 3); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1 and 2; Military 2.

SECOND YEAR

1. Differential Calculus (Math. 7); Land Surveying (Civil Eng'g 1); Physics 1 and 3; Rhetoric 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); Drawing and Surveying (Civil Eng'g 2 and 3); Physics 1 and 3; Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9); Drawing and Surveying (Civil Eng'g 2 and 3); Physics 1 and 3; Rhetoric 2; Military 2.

THIRD YEAR

1. Analytical Mechanics (Theo. and Appl'd Mech. 1); Railroad Engineering (Civil Eng'g 4); Chemistry 1.

2. Resistance of Materials (Theo. and Appl'd Mech. 2); Road Engineering (Mun. and San. Eng'g 1); Railroad Engineering (Civil Eng'g 4); Botany (Mun. and San. Eng'g 4); Steam Engines and Boilers (Mech. Eng'g 6, *half term*).

3. Hydraulics (Theo. and Appl'd Mech.3); Roofs (Arch. 5); Dynamo-Electric Machinery (Elect. Eng'g 1).

FOURTH YEAR

1. Water Supply Engineering (Mun. and San. Eng'g 2); Bacteriology (Mun. and San. Eng'g 5); Masonry Construction (Civil Eng'g 5); Thesis.

2. Sewerage (Mun. and San. Eng'g 3); Bridge Analysis (Civil Eng'g 8); Chemistry 3a; Thesis.

3. Tunneling (Civil Eng'g 9); Bridge Designing (Civil Eng'g 8); Chemistry 20; Thesis.

PHYSICS

The courses in this department are designed to furnish the student who intends to follow the profession of engineering, science teaching, or research in physical science, with such a knowledge of the phenomena and laws of physics as may be of greatest use in his chosen calling.

Instruction

The instruction is given by means of lectures and by practice in the laboratory. The work in the laboratory consists almost entirely of quantitative measurements made under the personal supervision of the instructors, with instruments of precision. An effort is made to have each student determine for himself the relations existing between the facts which he observes, in order to stimulate him to the formation of habits of sound thinking.

EQUIPMENT

The rooms devoted to physics are in Engineering Hall. They include a large lecture room and cabinet, a large general laboratory and cabinet, several small laboratories, a constant-temperature room, a battery room, a work shop, and several private studies, laboratories, and offices.

The *lecture room* is in the form of an amphitheater, and is furnished with opera chairs provided with tablet arms. Piers at the lecture desk and in the center of the room make demonstrations with the most delicate apparatus possible. A permanent screen and rolling blinds, operated by a motor, facilitate illustration by lantern. The cabinet rooms adjoining the lecture room are stocked with apparatus suitable for illustration and demonstration, and are provided with conveniences for preparing apparatus for lectures.

The *general laboratory* is a large, well lighted, well ventilated room. It is supplied with tables, shelves, and sinks, arranged for general experimental work. The cabinet room adjoining this laboratory contains a full line of apparatus suitable for elementary experimental work, and also a line of high-grade apparatus intended for advanced experimental work and research.

The *small laboratories*, six in number, are on the first floor, and are abundantly provided with masonry piers, wall shelves, sinks, dark curtains, etc. These rooms are now equipped with apparatus for electrical measurements.

The *constant-temperature* room is on the first floor. It is isolated from the surrounding space by double masonry walls and double doors. It is arranged for such experiments as require a low, uniform temperature.

The *workshop* is near the small laboratories. It is equipped with machines and tools for the manufacture and repair of apparatus.

In addition to the preceding, there are a number of private studies and laboratories for the use of advanced students and instructors.

Electrical current is supplied to all the laboratories from the battery room, and also from the dynamo laboratory in University Hall.

THEORETICAL AND APPLIED MECHANICS

The courses in theoretical and applied mechanics are designed to meet the needs of students of the College of Engineering.

Instruction

Training is given in the principles of the subject and in the applications and methods used in engineering design and construction. The text-book work is supplemented by lectures and reading. Stress is placed on the solution of engineering problems involving discrimination in the use of data and in the statement of conditions. Experimental work and investigation in the laboratory of applied mechanics is a part of the regular instruction. Opportunity is also given for advanced laboratory investigation for thesis and special work.

Equipment

The Laboratory of Applied Mechanics is located in the Engineering Laboratory. It comprises the materials laboratory and the hydraulic laboratory.

The *materials laboratory* has an Olsen testing machine of 200,000 pounds capacity, arranged to test beams twenty feet long; a Riehle testing machine of 100,000 pounds capacity; a smaller apparatus for testing beams, a Riehle wire-testing machine, extensometers, and deflectometers, a stone-grinding machine, a rattler for abrasion tests of stone and brick, with other apparatus for making all necessary measurements and observations, etc. The laboratory is fitted up as a working laboratory where students may acquire such practice in experimental work as engineers are called upon to perform, as well as for the purpose of illustrating principles, and also for use in original investigation. The ordinary work includes testing metals, wooden beams, cement briquettes, stone, and brick.

The *hydraulic laboratory* contains elevated tank and stand-pipe, steam pump for giving high pressure, tanks for measuring flow of water, pressure gauges, meters, water motor, turbine, and other apparatus for experiments with orifices, weirs, pipes, nozzles, etc. Experiments are made in connection with the regular class instruction.

COLLEGE OF SCIENCE

FACULTY

Andrew S. Draper, LL.D., President.
Stephen A. Forbes, Ph.D., Dean, Zoölogy.
Thomas J. Burrill, Ph.D., LL.D., Botany.
Samuel W. Shattuck, C.E., Mathematics.
Charles W. Rolfe, M.S., Geology.
Donald McIntosh, V.S., Materia Medica.
Arthur W. Palmer, Sc.D., Chemistry.
Frank F. Frederick, Art and Design.
Samuel W. Parr, M.S., Applied Chemistry.
David Kinley, Ph.D., Economics and Sociology.
Daniel H. Brush, Captain 17th Infantry, U. S. A., Military Science.
Arnold Tompkins, A.M., Pedagogy.
George W. Myers, M.L., Mathematics.
Henry E. Summers, B.S., Physiology and Vertebrate Anatomy.
Edgar J Townsend, Ph.M., Mathematics.
Evarts B. Greene, Ph.D., History.
Katharine Merrill, A.B., English.
William O. Krohn, Ph.D., Psychology.
Harry S. Grindley, Sc.D., Chemistry.
T. Arkle Clark, B.L., Rhetoric.
Herman S Piatt, A.M., French.
Arthur H. Daniels, Ph.D., Philosophy.
Fred A. Sager, B.S., Physics.
Charles W. Tooke, A.M., Political Science.
George D. Hammond, A.B., History.
William E. Sandford, Ph.C., Secretary, Pharmacy.
Frank Smith, A.M., Zoölogy.
Ralph P. Smith, Ph.B., German.
Helen E. Butterfield, M.L., Rhetoric.
George P. Clinton, M.S., Botany.

Alfred H. White, A.B., Chemistry.
Jeremiah G. Mosier, B.S., Geology.
Charles F. Hottes, M.S., Botany.
Edward J. Lake, B.S., Art and Design.
Ella H. Morrison, Physical Culture for Women.
Clendon V. Millar, M.S., Chemistry.
Oscar Quick, A.B., Physics.
Robert K. Porter, Military.

AIMS AND SCOPE

The College of Science is based upon the idea that the methods of science and the branches of study to which those methods are applicable present a subject matter and a discipline ample for the purposes of a liberal education, and that an education so derived differs materially in character and value from one whose sources are mainly literary. This College is distinguished in general from the technical colleges of the University by the fact that its choice of subjects is not limited by practical ends, and from the College of Literature and Arts by the predominance, in its courses and requirements, of the strictly scientific subjects. It is assimilated to the latter, however, by the liberal elections from the literary courses permitted to students who have satisfied its demands as to scientific work, and by the special courses in science open to election by students from the companion college.

It affords an opportunity for the study of the natural, physical, mathematical, and mental sciences, and of economic, sociological, and philosophical subjects, either as specialties or as the substance of a general education. The candidate for graduation may take a year each in any four of the principal subjects of this College, with a consideracle amount of language, literature, and general study; he may concentrate his major work on any one of the several subjects in which major courses are offered; or he may adopt any program of concentration of his major work intermediate between these extremes. The subjects presented in this College are accordingly arranged in four groups—chemical, mathematical, natural science, and philosophical—each characterized by the predominant importance and development of the subjects indicated by its name. The studies of each group are again divided into

required and elective subjects, and the latter are further subdivided into three lists, A, B, and C. All the required subjects are necessary to graduation in the group of studies specified ; those of the elective lists A and B are open to election, restricted only by certain general requirements, varying in the different groups, regarding the amount and distribution of the work to be done on them ; and those of list C are open to election unconditionally.

It is the purpose of this system of classification and requirement to permit large liberty of choice with respect both to main lines of study and to associated or secondary subjects, and at the same time so to guide the student's elections that his course of study shall always contain a central core or axis of closely articulated major work. Preference is further given by this means to those minor subjects most important because of their relations to the major work elected.

The only undergraduate degree given in this College is that of Bachelor of Science. Forty* full term-credits for University studies are required for graduation, three of which may be earned by investigation work, the results of which are to be presented in the final thesis. Credit will be given for fractions of courses of instruction in exceptional cases only, by vote of the College faculty.

EQUIPMENT

Laboratories.—The College of Science occupies two of the main University buildings—the Chemical Laboratory and Natural History Hall—together with several rooms in University Hall assigned to the mathematical department, and to some of the departments of the philosophical group. The natural history museum is also in University Hall.

The laboratory and library facilities of this College have been acquired with primary reference to the needs of the undergraduate student, and are scarcely surpassed, for their purpose, in grade and completeness, among American universities. The graduate student likewise finds here an ample equipment, material, and opportunity for independent investigation in several departments of study, notably in those covered by the operations of the State Laboratory of Natural History and of the State Entomologist's office.

*Forty-one in the chemical group.

Apparatus.—A detailed description of apparatus will be found under each department of instruction.

THE CHEMICAL GROUP

AIMS

The purposes of the chemical group may be stated under three heads: 1, General; 2, Technological; and 3, Pharmaceutical.

1. Provision is made for such students as desire to direct their attention to the purely scientific side of the subject, either as part of a general education or with the view of preparing themselves to become teachers of the physical sciences or investigators in the various branches of pure chemistry.

2. The constantly growing demand for chemical knowledge and skill in the industrial world is here recognized and provided for. Ample opportunities are offered to those who wish to follow work along technological lines, special attention being given to the underlying chemical principles and their applications in the various industries.

3. Courses in pharmacy provide on the one hand for those who expect to engage in the ordinary practice of the pharmacist and druggist, and on the other, for such as wish to prepare in a more thoroughly scientific manner for the work of the investigating and manufacturing pharmacist.

EQUIPMENT

Laboratories.—The chemical building is 75 by 120 feet and four stories high, including basement and mansard. The basement contains the water survey laboratory and rooms for storage, dispensing, and for work in assaying and metallurgical chemistry. The first floor has a lecture room which seats 150; a laboratory for general chemistry and qualitative analysis, which accommodates 150 students; and a large private laboratory, and a store room. The second floor has laboratories for quantitative analysis, organic chemistry, a balance and reading room, a room for the special operations of physical chemistry, two private laboratories, a store room, and a small lecture room. The third floor has a laboratory for gas analysis, pharmacy and prescription rooms, a chemical museum, apartments for photography, a small lecture room, and the chemical laboratory of the Agricultural Experiment Station.

Apparatus.—These laboratories are amply furnished with all the modern conveniences and supplies for the various lines of work in pure and applied chemistry and pharmacy.

The apparatus for general use includes twenty-four analytical balances of Sartorius's and Becker's make, a large platinum retort for making hydrofluoric acid, Geissler's mercurial air pumps, Soleil-Scheibler's saccharimeter, a large Landolt's polariscope, Hofmann's, and Lepsius's apparatus for lecture demonstrations, complete sets of apparatus for gas analysis, spectroscopes, etc.

A very important feature of the equipment consists of the chemical library which, in addition to all the modern standard chemical texts, dictionaries, and encyclopedias, includes complete sets of nearly all the more important chemical journals, especially the German and the English. The current numbers of many others are regularly received.

CLASSIFICATION OF SUBJECTS

Prescribed

1. *Chemical.*—General Elementary Chemistry (Chem. 1); 1 credit.

Descriptive Inorganic Chemistry (Chem. 2); 1 credit.
Elements of Organic Chemistry (Chem. 4); 1 credit.
Organic Chemistry (Chem. 9); 2 credits.
Qualitative Analysis (Chem. 3a, 3b); 2 credits.
Quantitative Analysis (Chem. 5a, 5b); 2 credits.
Seminary (Chem. 19); 2 credits.

2. *General.*—Advanced Algebra (Math. 1, 2); 1 credit.

German 1, 2, 5, 6; 5 or 6 credits.*
Military 1, 2; 2 credits.
Physics 1, 3; 3 credits.
Rhetoric 2; 2 credits.
Trigonometry (Math. 3 or 4); 1 credit.

Electives

List A (Chemical)

Advanced General Chemistry (Chem. 7); 1, 2, or 3 credits.
Agricultural Chemistry (Chem. 13); 2 credits.

*This requirement may be satisfied by courses 5 and 6, or by course 6, preceded by four terms of 1 and 2.

Chemical Technology (Chem. 6); 1 credit.
Iron and Steel Analysis (Chem. 8); 1 credit.
Industrial Chemistry (Chem. 17); 1 credit.
Metallurgy (Chem. 14); 1 credit.
Metallurgical Analysis and Assaying (Chem. 15); 1 credit.
Quantitative Analysis (Chem. 5c); 1 credit.
Sanitary Analysis (Chem. 10); 1 credit.
Special Courses (Chem. 18, a, b, c, d) $\frac{1}{5}$ to $5\frac{3}{5}$ credits.
Theoretical Chemistry (Chem. 12); 1 credit.
Thesis and Investigations (Chem. 11); 2 credits.

List B (General)

Botany 6, 1; 1 or 3 credits.
Electrical Engineering 1; 1 credit.
English 1 to 9; 9 credits.
Greek 1 to 3; 3 credits.
Geology 4, 1; 1, 2, or 3 credits.
Latin 1 to 3; 3 credits.
Mathematics 2 to 9; 3 or 4 credits.
Mechanical Engineering 1, 2, and 6; 1 or 2 credits.
Mineralogy 1, 2; 1 or 3 credits.
Physics 4 to 7; 11 credits.
Physiology 4, 1; 1 or 2 credits.
Theoretical and Applied Mechanics 1 to 5; 1 to 3 credits.
Zoölogy 3, 1; 2 or 3 credits.

List C

Anthropology 1; 1 credit.
Art and Design 5; 1 credit.
Astronomy 4; 1 credit.
Botany 2; 1 credit.
Chemistry (advanced work); 1 to 3 credits.
Economics 1 to 8; 2 to 6 credits.
French 1 or 5, 2; 3 or 6 credits.
German 2; 1 credit.
History 1, 2; $1\frac{1}{5}$ to 3 credits.
Materia Medica 1; 2 credits.
Meteorology 1; $\frac{1}{2}$ credit.
Military 3.
Pedagogy 1 to 7; 3 credits.

Philosophy 1 to 8; $\frac{2}{5}$ to 7 credits.
Political Science 1 to 9; $\frac{2}{5}$ to $9\frac{2}{5}$ credits.
Psychology 1 to 7, 9; 1 to 8 credits.

REQUIREMENTS FOR GRADUATION

In order to graduate in chemistry, the candidate must have completed all the required courses (25 credits), and must have at least three credits additional for subjects to be chosen from the chemical list A, of electives. For the thirteen remaining credits he must choose six subjects from list B and seven from lists B and C. He must make, in all, forty-one full term-credits, and present an acceptable thesis.

Special exceptions as to the required number of chemical options may be made for those who desire to prepare themselves as teachers of chemistry rather than as technical chemists.

COURSES OF INSTRUCTION BY YEARS AND TERMS

The following program of prescribed courses and chemical electives shows the terms in which the principal studies of the chemical group must be taken. The prescribed studies, which are in *italics*, must be taken also in the year and term indicated.

FIRST YEAR

1. *Advanced Algebra* (Math. 1 or 2); *General Introductory Chemistry* (Chem. 1); *German* 5 or 1; *Military* 1, 2.
2. *Descriptive Inorganic Chemistry* (Chem. 2); *German* 5 or 1; *Military* 1, 2; *Trigonometry* (Math. 3 or 4); *Qualitative Analysis* (Chem. 3a).
3. *Analytical Geometry* (Math. 6); *Descriptive Inorganic Chemistry* (Chem. 2); *Elements of Organic Chemistry* (Chem. 4); *German* 5 or 1; *Military* 2; *Qualitative Analysis* (Chem. 3b).

SECOND YEAR

1. German 2; *Military* 2; *Physics* 1, 3; *Quantitative Analysis* (Chem. 5a).
2. Advanced General Chemistry (Chem. 7); Agricultural Chemistry (Chem. 13); Chemical Technology (Chem. 6); *German* 6; *Military* 2; *Physics* 1, 3; *Quantitative Analysis* (Chem. 5b).

3. Advanced General Chemistry (Chem. 7); Agricultural Chemistry (Chem. 13); Chemical Technology (Chem. 6); *German* 6; Iron and Steel Analysis (Chem. 8); *Military* 2; Quantitative Analysis (Chem. 5c); *Physics* 1, 3.

THIRD YEAR

1. Advanced General Chemistry (Chem. 7); Metallurgical Analysis and Assaying (Chem. 15); Metallurgy (Chem. 14); *Rhetoric* 2; *Seminary* (Chem. 19).

2. Advanced General Chemistry (Chem. 7); *Organic Chemistry* (Chem. 9); *Rhetoric* 2; *Seminary* (Chem. 19); Theoretical Chemistry (Chem. 12).

3. Advanced General Chemistry (Chem. 7); *Organic Chemistry* (Chem. 9); *Rhetoric* 2; *Seminary* (Chem. 19); Theoretical Chemistry (Chem. 12).

FOURTH YEAR

1. Advanced General Chemistry (Chem. 7); Metallurgy (Chem. 14); Metallurgical Analysis and Assaying (Chem. 15); Sanitary Analysis (Chem. 10); *Seminary* (Chem. 19); Special Analytic Chemistry (Chem. 18).

2. Advanced General Chemistry (Chem. 7); *Seminary* (Chem. 19); Special Courses (Chem. 18); *Thesis and Investigations* (Chem. 11).

3. Advanced General Chemistry (Chem. 7); *Seminary* (Chem. 19); Special Courses (Chem. 18); *Thesis and Investigations* (Chem. 11).

APPLIED CHEMISTRY AND ENGINEERING

To meet the needs of those who wish to fit themselves for such work as devolves upon the managers of establishments in which the operations depend upon chemical processes, a four years' course in chemistry with related engineering subjects has been arranged.

Requirements for Graduation

The requirements for graduation are not varied from those already indicated on p. 89, except that the electives to be chosen from lists B and C must include certain engineering subjects, as follows: a minimum of three subjects shall be

chosen from those listed under "Mathematics" in the general description of courses; a minimum of six subjects shall be taken from those listed under "Mechanical Engineering," and a minimum of two subjects from those listed under "Mechanics, Theoretical and Applied." A chemical thesis is required and completion of the work leads to the degree of Bachelor of Science in Chemistry and Engineering.

Courses of Instruction by Years and Terms

The prescribed and chemical electives, together with the necessary engineering subjects to meet the above conditions, are indicated below. Subjects must be taken in the term indicated, and those in *italics* must be taken in the year indicated.

FIRST YEAR

1. *Advanced Algebra* (Math. 1, 2); Drawing, Gen'l Eng'g, 1, 4; *General Chemistry* (Chem. 1); *German* 1, 5; Military 1, 2.

2. *Descriptive Inorganic Chemistry* (Chem. 2); *German*, 1, 5; *Military*, 1, 2; *Qualitative Analysis* (Chem. 3a); *Trigonometry* (Math. 3, 4).

3. Analytical Geometry (Math. 6); *Descriptive Inorganic Chemistry* (Chem. 2); Elements of *Organic Chemistry* (Chem. 4); *German*, 1, 5; *Qualitative Analysis* (Chem. 3b); *Military*, 2.

SECOND YEAR

1. Differential Calculus (Math. 7); *Military* 2; *Physics* 1, 3; *Quantitative Analysis* (Chem. 5a); *Rhetoric* 2; Shop Practice (Mech. Eng'g 1).

2. Advanced Analytical Geometry (Math. 8); *German* 6; *Military* 2; *Physics* 1, 3; *Quantitative Analysis* (Chem. 5b); *Rhetoric* 2; Shop Practice (Mech. Eng'g 1).

3. *German* 6; Integral Calculus (Math. 9); Iron and Steel Analysis (Chem. 8); *Military* 2; *Physics* 1, 3; *Rhetoric* 2; Shop Practice (Mech. Eng'g 1).

THIRD YEAR

1. Analytical Mechanics (Theo. and Appl'd Mech. 1 or 4); Metallurgy (Chem. 15); Metallurgical Analysis and Assaying

(Chem. 14); Shop Practice (Mech. Eng'g 2); Special Analytical Chemistry (Chem. 18); *Seminary* (Chem. 19).

2. Chemical Technology (Chem. 6); Industrial Chemistry (Chem. 17); *Organic Chemistry* (Chem. 9); Resistance of Materials (Theo. and Appl'd Mech. 2 or 5); *Seminary* (Chem. 19); Steam Engines and Boilers (Mech. Eng'g 6); Shop Practice (Mech. Eng'g 2).

3. Chemical Technology (Chem. 6); Electrical Engineering 1; Hydraulics (Theo. and Appl'd Mech. 3); Organic Chemistry (Chem. 9); Special Analytical Chemistry (Chem. 18); *Seminary* (Chem. 19); Shop Practice (Mech. Eng'g 2).

FOURTH YEAR

1. Chemistry 14, 15, 18; Thermodynamics (Mech. Eng'g 7).

2. Chemistry 6, 12, 17, 18; Steam Engines and Boilers (Mech. Eng'g 6); *Thesis and Investigation* (Chem. 11).

3. Chemistry 6, 12, 18; Civil Engineering 1; *Thesis and Investigation* (Chem. 11).

PHARMACY

Instruction

The instruction is conducted by means of lectures, textbooks, and laboratory work. The laboratory practice consists in the compounding of the galenicals, in pharmaceutical assaying, and in prescription work. The requirements of the United States Pharmacopœia are always kept in mind and the student must conform to its rules; he is, therefore, held responsible for the purity and strength of his preparations and for the accuracy of his work.

Equipment

The department of pharmacy occupies a part of the chemical building, and is in direct connection with the chemical laboratories. It has the use of the very complete supply of apparatus belonging to the chemical department, and is also provided with apparatus for the special work in pharmacy. All the various forms of percolators, pill machines, suppository moulds, tablet moulds, etc., are at the disposal of the student.

A drug room is arranged as nearly like the drug shop as is possible, and contains a large prescription desk supplied with

a complete set of apparatus and materials necessary for the compounding of prescriptions. It is designed to give the student as much practical work as is possible in a technical school. Over two hundred crude drugs make up a part of the equipment for the study of pharmacognosy.

Several of the leading journals of pharmacy are taken and these, together with the complete library of chemical and pharmaceutical works, afford excellent opportunities for examining the literature bearing on the science of pharmacy.

Requirements for Graduation

With Degree of B. S. in course of Chemistry and Pharmacy

The general requirements are the same as in the chemical course proper; more specifically there are required:

Botany 1; 1 to 3 credits.
Botany 7; 1 credit.
Chemistry 1, 2, 3, 4, 5a, 9; 8 credits.
German 5, 6; 5 credits.
Mathematics 1, 3; 2 credits.
Materia Medica 1; 2 credits.
Military 1, 2; 2 credits.
Pharmacy 1, 2, 3, 4, 5; 8 credits.
Pharmaceutical Assaying (Pharm. 5); 1 credit.
Pharmaceutical Preparations (Pharm. 2); 2 credits.
Pharmaceutical Technology (Pharm. 4); 2 credits.
Pharmacognosy (Pharm. 3); 2 credits.
Physics 1, 3; 3 credits.
Rhetoric 2; 2 credits.
Thesis and Investigation (Chem. 11); 2 credits.

The subjects of the four remaining credits which are required for graduation may be selected from chemical electives, lists A, B, and C.

Courses of Instruction by Years and Terms

The courses mentioned in the following list must be taken in the indicated year and term:

FIRST YEAR

1. *Advanced Algebra* (Math. 1); *Chemistry*, General Introductory (Chem. 1); *German* 5; *Military* 1, 2.

2. *Descriptive Inorganic Chemistry* (Chem. 2); *German* 5; *Military* 1, 2; *Qualitative Analysis* (Chem. 3a); *Trigonometry* (Math. 3).

3. *Descriptive Inorganic Chemistry* (Chem. 2); *Elements of Organic Chemistry* (Chem. 4); *German* (5); *Military* 2; *Qualitative Analysis* (Chem. 3b).

SECOND YEAR

1. *Botany* 1; *Pharmacy* 1; *Quantitative Analysis* (Chem. 5a); *Rhetoric* 2.

2. *Botany* 1, 7; *German* 6; *Pharmaceutical Preparations* (Pharm. 2); Quantitative Analysis Chem. 5b; *Rhetoric* 2.

3. Botany 1, 7; *German* 6; *Pharmaceutical Preparations* (Pharm. 2); Quantitative Analysis (Chem. 5c); *Rhetoric* 2.

THIRD YEAR

1. *Materia Medica* 1; *Pharmacognosy* (Pharm. 3) *Physics* 1, 3; *Seminary* (Chem. 19).

2. *Materia Medica* 1; Organic Chemistry (Chem. 9); *Physics* (1, 3); *Seminary* (Chem. 19).

3. *Organic Chemistry* (Chem, 9); *Pharmaceutical Assaying* (Chem. 5); *Physics* (1, 3); *Seminary* (Chem. 19).

FOURTH YEAR

1. Elective ; *Pharmaceutical Technology* (Pharm. 4); *Seminary* (Chem. 19).

2. Elective ; *Pharmaceutical Technology* (Pharm. 4); Investigation and Thesis (Chem. 11); *Seminary* (Chem. 19).

3. Elective; Pharmacognosy (Pharm. 3b); Investigation and Thesis (Chem. 11); *Seminary* (Chem. 19).

Short Course in Pharmacy

A briefer course in pharmacy is offered, covering two years. The subjects are all prescribed and are as follows:

FIRST YEAR

1. Botany 1; General Introductory Chemistry (Chem. 1); Military 1, 2; Pharmacy 1; Pharmacognosy (Pharm. 3).

2. Descriptive Inorganic Chemistry (Chem. 2); Military 1, 2; Pharmaceutical Botany (Bot. 7); Pharmaceutical Preparations (Pharm. 2); Qualitative Analysis (Chem. 3a).

3. Military 2; Organic Chemistry (Chem. 4); Pharmaceutical Botany (Bot. 7); Pharmaceutical Preparations (Pharm. 2); Qualitative Analysis (Chem. 3b).

SECOND YEAR

1. Advanced work in Chemistry or Pharmacy; Materia Medica 1; Military 2; Pharmaceutical Technology (Pharm. 4); Quantitative Analysis (Chem. 5a).
2. Advanced work in Chemistry or Pharmacy; Materia Medica 1; Military 2; Pharmaceutical Technology (Pharm. 4); Quantitative Analysis (Chem. 5b).
3. Advanced work in Chemistry or Pharmacy; Military 2; Pharmaceutical Assaying (Pharm. 5); Pharmacognosy (Pharm. 3b); Thesis.

By an earnest prosecution of the studies laid out in this course the student may thoroughly prepare himself for the examinations required by the State Board of Pharmacy for registration as a pharmacist.

The work outlined above leaves no time during the college year for the drug store practice required by law for a registered pharmacist. This practice must, therefore, be had at other times, preferably before the college course.

DESCRIPTION OF DEPARTMENTS

Chemistry

The chemical offerings include courses of instruction in general elementary, inorganic, organic, physical, and theoretical chemistry, and several lines of qualitative and quantitative analysis. [See under *Chemistry* in Description of Courses.]

The first term is devoted to the consideration of the fundamental principles of chemistry, the purpose being to afford as thorough an introduction to chemical science as is practicable in the time alloted.

In succeeding courses the work becomes more special in character, but the required chemical subjects constitute a backbone of scientific preparation which provides opportunity for a thorough grounding in the principles and laws of chemistry; while, by proper selection from the numerous electives one may specialize along any of the lines of analytical or

applied chemistry, or pharmacy, or may further develop his knowledge of pure chemistry.

In order that an acquaintance with chemical literature may be had, and to keep pace with the advances in chemistry, students of the third and fourth years are required to take part in the chemical seminary in which the work consists chiefly of reviews and discussions of assigned articles in current numbers of the various journals.

Two terms' work in the fourth year are devoted to the investigation of some chemical problem. This practice both furnishes an opportunity to specialize along some chosen line and serves as an introduction to the methods of chemical research.

To students who are preparing themselves to become teachers of science, an opportunity is offered for the acquirement of some experience in supervising laboratory practice in Elementary Chemistry. The work will include criticism and discussion of methods, and application of pedagogical principles and will be conducted with the coöperation of the department of pedagogy.

APPLIED CHEMISTRY

In this department there are offered ten separate courses in technological subjects. These require as preliminary work the seven general and analytical courses from 1 to 5b inclusive. They may be further supplemented by special advanced work along some chosen line. For special description of courses, see under *Chemistry* in the DESCRIPTION OF COURSES. Frequent visits are made to metallurgical and other works employing chemical processes. Seminary work along general and technical lines is conducted for two years of the course. The purpose of the course is to offer the largest possible opportunity for equipment as technical and manufacturing chemists, superintendents, etc., or as chemical engineers in the work of supervising or planning the installation of metallurgical or other chemical plants.

PHARMACY

Two courses in pharmacy are offered, one covering two years and the other, which leads to the degree of Bachelor of Science, extending over four years. The former is designed

particularly for those who intend engaging in pharmacy as a business. The four years' course includes all the practical work of the shorter course, but extends farther, and furnishes a more complete training in the chemistry of pharmacy. The intention is to offer a thorough scientific training to students who desire to become pharmaceutical chemists, or chemists to the medical profession, to engage in manufacturing or to devote themselves to scientific investigation in pharmacy.

THE MATHEMATICAL GROUP

INSTRUCTION

The mathematical group of studies includes the entire offering of the University courses in pure mathematics, physics, and astronomy.

The instruction in pure mathematics has for its object the promotion of habits of mental concentration and continuity of thought, the development of the capacity to form and combine abstract conceptions and the cultivation of deductive reasoning, and to give such mathematical knowledge as is required for the study of the professional work in the College of Engineering. For this last purpose the greater part of the time is necessarily taken up with the theory and its application to geometrical magnitudes. It is hoped that the course thus planned will meet the requirements of those who need mathematics as a tool, of those who wish to fit themselves for instructors, and of those who study the science for the love of it.

Parallel with the pure mathematics of the junior and senior years, two lines of associated work in applied mathematics—physical and astronomical—are offered, either of which may be, and one of which must be, taken by the student wishing to graduate in the studies of the mathematical group. One of these lines leads from the physics of the sophomore year through the mathematical theory of electricity and magnetism, heat, light, and sound; and the other through surveying and mechanics to celestial mechanics, and to general and mathematical astronomy. Courses 10 to 18 count as graduate work for all students except those taking their first degree in mathematics.

CLASSIFICATION OF SUBJECTS

Prescribed

General Engineering Drawing 1, 4; 1 credit.
General Engineering Drawing 2, 5; 2 credits.
Mathematics 2 (Advanced Algebra); 1 credit.
Mathematics 4 (Trigonometry); 1 credit.
Mathematics 6 (Analytical Geometry); 1 credit.
Mathematics 7 (Differential Calculus); 1 credit.
Mathematics 8 (Advanced Analytical Geometry); 1 credit.
Mathematics 9 (Integral Calculus); 1 credit.
Mathematics 10 (Theory of Equations); 1 credit.
Mathematics 11 (Theory of Determinants); 1 credit.
Mathematics 12 (Theory of Invariants); 1 credit.
Mathematics 13 (Theory of Functions); 1 credit.
Mathematics 14 (Method of Least Squares); $\frac{3}{5}$ credit.
Mathematics 15 (Seminary and Thesis); $1\frac{1}{5}$ credits.
Mathematics 16 (Differential Equations); $\frac{4}{5}$ credit.
Mathematics 17 (Geometry of Space); 1 credit.
Mathematics 18 (Higher Plane Curves); 1 credit.
German 1, 2, 5, 6, or French 1, 2, 5; 5 or 6 credits.
Military Science, 1, 2; 2 credits.
Physics 1; 2 credits.
Rhetoric 2; 2 credits.

Elective

List A (Astronomical)

Astronomy (Descrip.); 1 credit; (Mathemat.); $1\frac{3}{5}$ credit.
Civil Engineering 10; 1 credit.
Mechanics (Celestial); 1 credit.
Mechanics (Theoretical and Applied 1); 1 credit.

List B (Physical)

Physics 1, 3; 3 credits.
Physics 5 (Theory of Electricity and Magnetism); 3 credits.
Physics 6 (Theory of Light, Heat, and Sound); 3 credits.

List C

Anthropology 1; 1 credit.
Botany 1 or 6; 1 or 3 credits.

Chemistry 1, 3a, 3b, or 4; 1 or 3 credits.
Economics 1 to 8; 2 to 6 credits.
English 1, 2; 3 credits.
French 1, 5, 2, or German 1, 5, 2, 6; 6 credits
Geology 1, 3, 4; 1, 2, or 3 credits.
History 1, 2; 1 or 3 credits.
Latin 1, 2, 3; 3 credits.
Meteorology 1; $\frac{2}{5}$ credits.
Mineralogy 1, 2; 1 or 3 credits.
Pedagogy 1 to 7; 1 to 4 credits.
Philosophy 1 to 8; 1 to 4 credits.
Physiology 1 or 4; 1 or 3 credits.
Political Science 1 to 9; $\frac{2}{5}$ to $9\frac{2}{5}$ credits.
Psychology 1 to 8; 1 to 4 credits.
Zoölogy 1, 8, 10; 1, 2, or 3 credits.

REQUIREMENTS FOR GRADUATION

To graduate as a Bachelor of Science in the mathematical studies, it is necessary for the student to complete the required subjects of this group, together with those of either the astronomical or the physical list (A or B) of electives, and to present an acceptable thesis. The necessary number of forty full term-credits for University studies may then be made up by election from lists A, B, and C.

COURSES OF INSTRUCTION BY YEARS AND TERMS

The studies of the mathematical group may best be taken according to the following outlines of courses in mathematics and physics, and in mathematics and astronomy respectively.*

The electives provided for in the junior and senior years may be readily chosen by a reference to the preceding lists of electives and to the scheme or table of subjects by years and terms.

Course in Mathematics and Physics

FIRST YEAR

1. Advanced Algebra (Math. 3); Engineering Drawing 1, 4; French 1, 5, or German 5; Military 1, 2; Rhetoric 2.

*The two courses are identical for the freshman and sophomore years.

2. Trigonometry (Math. 4); Descriptive Geometry and Lettering (Drawing, Gen'l Eng'g 2, 3); French 1, 5, or German 5; Military 1, 2; Rhetoric 2.

3. Analytical Geometry (Math. 6); Descriptive Geometry (Drawing, Gen'l Eng'g 2); French 1, 5, or German 5; Military 2; Rhetoric 2.

SECOND YEAR

1. Differential Calculus (Math. 7); Physics 1, 3; French 2 or German 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); French 2, or German 2, 6; Military 2; Physics 1, 3.

3. Integral Calculus (Math. 9); French 2, or German 2, 6; Military 2; Physics 1, 3, or Surveying.

THIRD YEAR

1. Theory of Equations (Math. 10); Physics 5; Electives.

2. Theory of Determinants (Math. 11); Physics 5; Electives.

3. Theory of Invariants (Math. 12); Physics 5; Electives.

FOURTH YEAR

1. Theory of Functions (Math. 13); Method of Least Squares (Math. 14); Physics 6; Mathematical Seminary and Thesis (Math. 15); Electives.

2. Differential Equations (Math. 16); Geometry of Space (Math. 17); Physics 6; Mathematical Seminary and Thesis (Math. 15); Electives.

3. Differential Equations (Math. 16); Higher Plane Curves (Math. 18); Physics 6; Mathematical Seminary and Thesis (Math. 15); Electives.

Course in Mathematics and Astronomy

The freshman and sophomore years are the same as in the preceding course.

THIRD YEAR

1. Theory of Equations (Math. 10); Mechanics, Theo. and App. 1; Electives.

2. Theory of Determinants (Math. 11); Celestial Mechanics (Astron. 1); Electives.

3. Theory of Invariants (Math. 12); General Astronomy; Electives.

FOURTH YEAR

1. Theory of Functions (Math. 13); Method of Least Squares (Math. 14); Mathematical Astronomy; Mathematical Seminary and Thesis; Electives.

2. Differential Equations (Math. 16); Geometry of Space (Math. 17); Mathematical Astronomy; Mathematical Seminary and Thesis; Electives.

3. Differential Equations (Math. 16); Higher Plane Curves (Math. 18); Mathematical Astronomy; Mathematical Seminary and Thesis; Electives.

THE NATURAL SCIENCE GROUP

AIMS

The courses of the natural science group are especially intended:

1. To give a thorough liberal education with a basis in the objective sciences.

2. To prepare for the pursuit of specialties in zoölogy, entomology, physiology, botany, or geology, as a scientific career.

3. To lay in biological work and study a liberal foundation for a course in medicine.

4. To prepare for the teaching of the natural or physical sciences in high schools and colleges.

Special advantages are offered to graduate students, for whose work the museums, laboratories, and libraries, and the field and experimental equipment of the University and of the associated State Laboratory of Natural History, furnish an extraordinarily full provision. The University Biological Station, at Havana, is regarded as one of the University laboratories, and work done there by students may receive credit like work in any of the other laboratories.

CLASSIFICATION OF SUBJECTS

PRESCRIBED

Art and Design 4; 2 credits.
Chemistry 1, 3a, and 3b or 4; 3 credits.
German 1, 2, 5, 6; 5 or 6 credits.*
Mathematics 1 to 6; 2 credits.

*This requirement may be satisfied by courses 5 and 6, or by course 6 preceded by four terms of 1 and 2.

Military Science 1, 2; 2 credits.
Rhetoric 2; 2 credits.

Elective

*List A** (Major Courses)

Biology, General; 1 credit.
Botany 1 to 5; 3 to 6, or 9 credits.
Chemistry 5, 7, 9, 12; 3 credits.
Geology 1, 2; 2 to 6 credits.
Mineralogy 1, 2; 1, 2, or 3 credits.
Paleontology 1; 2 credits.
Physics 1, 3; 3 credits.
Physiology 1, 2, 3; 2, 3, or 7 credits.
Zoölogy 1, 2, 3, 4 to 7, 9; 2 to 9 credits.

List B (Minor Courses)

Botany 6; 1 credit.
Geology 4; 1 credit.
Physics 2; 1 credit.
Physiology 4; 1 credit.
Zoölogy 10; 1 credit.

List C (Miscellaneous)

Anthropology 1; 1 credit.
Art and Design 1; 1 credit.
Astronomy 4; 1 credit.
Economics 1 to 8; 2 to 8 credits.
English 1, 2, 5, 6; 3 or 6 credits.
French 1, 2, 5; 3 or 6 credits.
German 2; 1 credit.
History 1, 2, 3; 3 or 6 credits.
Mathematics 5 to 11; 4 credits.
Meteorology 1; $\frac{1}{2}$ credit.
Pedagogy 1 to 8; 2 to 10 credits.
Pharmacology 2 credits.
Philosophy 1 to 8; 1 to 7 credits.
Political Science 1 to 9; $\frac{2}{5}$ to $9\frac{2}{5}$ credits.
Psychology 1 to 8; 1 to 9 credits.
Zoölogy 11; 1 credit.

*No number of credits in any subject will be accepted as major work other than the numbers specified against that subject in list A. Credit will not be given for both major and minor work in the same subject.

The major and minor courses in Lists A and B in this group are respectively the maximum offerings and the minimum requirements in the various subjects of these lists.

REQUIREMENTS FOR GRADUATION

In the natural science group a student may graduate from either a specialized or a general course.

A specialized course is one containing at least two years of major work in a single subject preceding the senior year, followed by an additional year of major work in that subject, and the writing of an acceptable thesis. No student may be enrolled in a specialized course without the permission of the head of the department in which he wishes to do his principal work; and each student who wishes to be so enrolled must specify the course he desires to enter not later than the beginning of his junior year. Only those students who pursue a specialized course shall be selected for fellowships, scholarships, and other similar University honors. A general course is one in which less than three years' work in any one line is required for graduation, and in which no thesis is required.

Students who specialize in geology or mineralogy may count all work done in these branches, and their credits in chemistry, in the list of credits required before the beginning of the senior year.

No student may graduate in natural science until he has completed all the required courses, has done at least nine terms' work on one major elective, or twelve terms' work on more than one such major (list A), and has taken at least minor courses in all the other electives in which such courses are offered (list B). The necessary number of forty full term-credits for University studies may be made up by additional elections from the three lists of electives, except that at least five of them must be chosen from list C.

COURSES OF INSTRUCTION BY YEARS AND TERMS

The following list of prescribed studies and major electives shows the terms in which the principal studies of the natural science group must be taken. The prescribed studies,

which are in *italics*, must be taken also in the year indicated. Students intending to graduate from a specialized course should begin the study of their special subject at the earliest time practicable.

FIRST YEAR

1. *Advanced Algebra* (Math. 1, 2); *Art and Design* 4; *Chemistry* 1; *Military* 1, 2; Zoölogy 10 11.

2. *Chemistry* 3a; *Military* 1, 2; *Trigonometry* (Math. 3, 4); Zoölogy 1, 2, 3.

3. *Art and Design* 4; *Chemistry* 3b, 4; Entomology, Practical (Zoöl. 8); *Military* 2, 3; Zoölogy 1, 2.

SECOND YEAR

1. Botany 1; *German* 5; *Military* 2, 3; Mineralogy 1; Physics 1, 3; Zoölogy 1, 3, 5, 10 11.

2. Botany 1; Embryology (Zoöl. 4); Entomology (Zoöl. 6); Geology 1; *German* 1, 5; *Military* 2, 3; Physics 1, 3; Physiology 1.

3. Biology, General, 1; Botany 1; Entomology (Zoöl. 6); Geology 1; *German* 5; *Military* 2, 3; Physics 1, 3; Physiology 1.

THIRD YEAR

1. Bacteriology (Bot. 2); Botany 3; Entomology, Advanced (Zoöl. 7); Geology 1; *German* 2; Physiology 2; *Rhetoric* 2; Zoölogy 1, 10 11.

2. Botany 3; *German* 6; Military 3; Mineralogy 2; Paleontology 1; Physiology 2; *Rhetoric* 2; Zoölogy 4 (Embryology), 5, 6 (Entomology), 7.

3. Biology, General; Botany 4; *German* 6; Mineralogy 2; Paleontology 1; Physiology 2; *Rhetoric* 2; Zoölogy 5, 6 (Entomology), 7, 8.

FOURTH YEAR

1. Thesis (Bot. 5; Geol. 2; Zoöl. 9).

2. Thesis (Bot. 5; Geol. 2; Physiol. 3; Zoöl. 9).

3. Biology, General; Mineralogy 2; Paleontology 1; Thesis (Bot. 5; Geol. 2; Physiol. 3; Zoöl. 9).

SUGGESTIONS AS TO CHOICE OF COURSES

Students wishing to take major courses in several biological subjects, with the intention of graduating in natural science without a thesis, should take the required subjects of the freshman year together with zoölogy 2; may follow this in the second year with botany 1, German, physics, and military, each throughout the year; may select for the junior year mineralogy 1, to be followed by geology 1, bacteriology or elementary entomology, embryology, general biology, German, minor physiology, and rhetoric 2, finishing geology 1 in the fall term of the senior year, and completing their course by selecting studies amounting to eight elective credits from the remaining subjects open to them. Numerous variations of this course may readily be arranged to the same general effect.

Those wishing to concentrate their major work in zoölogy only, should take courses 1, 4, and 5 in zoölogy, beginning with the second term of the freshman year; minor courses in physiology, physics, and botany, in the second year; mineralogy 1 and geology 4 in the third year; and anthropology 1, general biology, and thesis investigation during the senior year.

For a zoölogical course with principal reference to entomology, zoölogy 2 may be taken instead of 1, and followed by courses 6 and 7, with the omission of course 4 from the above list.

The student desiring to specialize in physiology should take zoölogy 3 and follow it with all the physiology offered, except course 4. His work may be otherwise like that suggested above for the zoölogical specialist.

A special course in botany may be made up on lines similar to those of the special zoölogical course by taking, instead of major zoölogy, the botanical courses 1 to 4 in the second and third years, preferably preceded by general biology 1 in the freshman year, and followed by botany 5 (thesis work).

Students who desire to make the most of the offerings in geology are advised to take chemistry in the freshman year, begin their mineralogy in the fall term of the sophomore year, take geology in the winter and spring terms of that year and the fall term of the junior year, take mineralogy 2, or paleontology 1 during the winter and spring terms of the junior year, and the remaining subjects together with thesis investigation (geology 2) during the senior year.

SPECIAL COURSES PRELIMINARY TO MEDICINE

Students desiring a course of study leading to a degree in natural science as a liberal preparation for a course in medicine are advised to take the list of studies required for graduation (16 credits), together with zoölogy 3, embryology (zoölogy 5), physiology 1 (or 1 and 2), general biology 2, botany 6, bacteriology (botany 2), physics 1, 3, mineralogy 1, geology 4, pharmacology 1, psychology 3, and logic (philosophy 8).

This course may be conveniently arranged as follows:

Major Course

FIRST YEAR

1. *Advanced Algebra* (Math. 1); *Art and Design* 1; *Chemistry* 1; *Military* 1, 2.
2. *Chemistry* 3a; *Military* 1, 2; *Trigonometry* (Math. 3); Zoölogy 3.
3. *Art and Design* 2; Botany 6; *Chemistry* 4; *Military* 2.

SECOND YEAR

1. *German* 5; *Military* 2; Physics 1, 3; Zoölogy 3.
2. *German* 5; *Military* 2; Physics 1, 3; Physiology 1.
3. *German* 5; *Military* 2; Physics 1, 3; Physiology 1.

THIRD YEAR

1. Bacteriology (Bot. 2); French 5 or Physiology 2; *German* 2; *Rhetoric* 2.
2. French 5 or Physiology 2; *Rhetoric* 2; Zoölogy 4.
3. Biology, General; French 5 or Physiology 2; *German* 6; *Rhetoric* 2.

FOURTH YEAR

1. Pharmacology; Psychology 2.
2. Geology 4; Pharmacology; Botany 3.
3. Chemistry 20; Pharmacy 2; Philosophy 8.

For the benefit of those who are preparing for medicine but who cannot take more than a two years' course at the University, the following scheme of study is suggested:

Minor Course

FIRST YEAR

1. Advanced Algebra (Math. 1); Art and Design 1; Chemistry 1; Military 1, 2.
2. Chemistry 3b; Military 1, 2; Trigonometry (Math. 2); Zoölogy 3.
3. Astronomy 4; Botany 6; Chemistry 4; Military 2.

SECOND YEAR

1. Bacteriology (Bot. 2); Military 2; Physics 1, 3; Zoölogy 3.
2. Embryology (Zoöl. 4); Military 2; Physics 1, 3; Physiology 1.
3. Biology, General; Military 2; Physics 1, 3; Physiology 1.

DESCRIPTIONS OF DEPARTMENTS

Botany

Seven courses of instruction are offered in this subject—five primarily intended to meet the wants of students making botanical work more or less a specialty, and the sixth occupying a single term, complete in itself, for students whose chief attention is given to other branches. Three to nine terms' work constitutes a major course; that of the single term, course 6, a minor course. To a very large extent natural objects are studied rather than books, but constant endeavor is made to introduce students to pertinent existing literature. In the laboratory much use is made of the compound microscope, and special attention is given to its manipulation for best results, and to the preparation of objects. The seventh course is pharmaceutical botany.

EQUIPMENT

The botanical laboratories are: One of large size with full equipment of microscopes, microtomes, aquaria, models, charts, etc., for general work; one specially arranged and fitted up for bacteriological instruction and investigation, supplied with sterilizers, thermostats, microscopes, a full line of glassware, metal vessels, and chemicals; one adjoining the latter and used in connection with it for vegetable physiology, and having

attached a glazed structure, two stories in height, well adapted to facilitate experiments upon living plants and for the growth of specimens required in the laboratories. There are also provisions for private laboratory work by instructors. The department is furnished with a lecture room; a room for the herbarium and facilities for work in connection therewith; workrooms for the preparation of specimens and material; storage rooms for apparatus, utensils, reagents, and materials; dark room for photography; and rooms for offices—all in convenient association and provided with the necessary materials; and apparatus for ordinary class work and for advanced research.

Special attention has been given to parasitic fungi; and the collections of specimens and of the literature upon the subject are ample for various lines of original investigation.

Geology and Mineralogy

In this department four courses are offered in geology, two in mineralogy, and one in paleontology.

For students who wish more than a general acquaintance with these subjects, a course covering thirty-six weeks of class room and laboratory instruction has been arranged in geology, a like course in mineralogy, and one of twenty-two weeks in paleontology. A supplementary course of twenty-two to thirty-six weeks is offered those who select a geological subject for a thesis.

Engineers who wish an acquaintance with those portions only of geology which bear most directly on their future work, are offered a course of eleven weeks.

To those who desire merely an outline of the most prominent facts and theories of geology, with some idea of the methods by which the geologist arrives at his conclusions, a course of eleven weeks is offered. All these courses are fully described under "Description of Courses."

EQUIPMENT

Apparatus.—The mineralogical laboratory contains individual desks for twenty-four students, each of which is furnished with reagent bottles, Bunsen burners, and all the other apparatus now considered necessary to a complete outfit for blowpipe work in a first-class laboratory. It is also provided

with a spectroscope; a specific gravity balance; an analytical balance; a trip scale; mortars (diamond, agate, wedgwood, and iron); a chemical hood equipped with sink and a complete set of reagents and apparatus for qualitative analysis; a blast lamp and blower.

The advanced laboratory is equipped with individual desks for sixteen students, each supplied with apparatus as above; goniometers; microscopes; crystal models (550); thin sections of minerals and rocks (570); an apparatus for cutting and grinding thin sections of rocks, with a Jenney motor; a self-registering barometer; an aneroid barometer, and a telescopic hand level for topographic work.

For the recitation room there is a set of Kiepert's physical maps; Ramsay's orographic map of the British Isles; Haart's Alps; Chauvauni's Asia; geological and soil maps of Illinois; a series of geological maps of the United States representing land development during the successive periods; a set of charts illustrating orography, erosion, deposition of metals, etc.; a series of relief maps; a complete lantern outfit with microscope and solar attachment; four hundred lantern slides; an equipment for photography and the manufacture of lantern slides.

Materials.—The collection of fossils comes principally from the paleozoic, but includes a representative series from the higher groups. It contains 43,400 specimens. Six hundred and fifty of the types described in the reports of the Illinois geological survey are included, and also 200 thin sections of corals and bryozoa.

The collection of minerals contains 7,109 specimens, and that of rocks 2,912 specimens, among which is a large number of polished granites, marbles, and other ornamental building stones.

There is also a collection of Illinois soils containing 76 specimens; and a large collection of Illinois clays with their manufactured products.

Physiology

The special objects of the courses in human physiology are as follows: (1) to give to prospective students of medicine a detailed practical knowledge of the normal histological structure and vital processes of the body and a working familiarity with the instruments of precision used in the investigation of

disease. (2) To give to students of all branches of biology a training in deducing logically necessary conclusions from data obtained by their own observations. (3) To furnish such a knowledge of physiology as will serve as a basis for future studies in hygiene.

The laboratory method of instruction is chiefly followed, supplemented, when desirable, by lectures, demonstrations, references to standard literature, and recitations. The laboratory work predominates in the major and advanced courses; the lectures, demonstrations, and recitations in the minor course. In the more advanced courses each subject is treated, so far as time will permit, as if it were an original investigation. The student is guided to the best methods to be pursued, but the results are left for him to discover. At frequent intervals the results obtained are reviewed by the instructor, and, when necessary, completed, unified, and correlated with the facts learned from previous investigation, care being taken to show the student wherein he failed to obtain a full knowledge of the subject.

EQUIPMENT

The department of physiology occupies four rooms in Natural History Hall; a general laboratory, a lecture room, and a private laboratory on the top floor, and an animal room in the basement. The general laboratory, thirty-five by fifty-six feet, is fitted at one end with desks of the most approved pattern for chemical and similar work, and at the other end with heavy tables, especially designed for use with the microscope and other apparatus requiring a stable support. The private laboratory and preparation room of the instructor is furnished with cupboards for apparatus and reagents.

The apparatus of the department may be roughly divided into three classes: That for physico-physiolgical work, that for chemico-physiological work, and that for the mammalian anatomy and histology necessarily taught in connection with the physiology proper. In the first class may be mentioned a Ludwig Kymograph (Zimmermann's latest model) with automatic movement of the cylinder in the line of its axis, and an arrangement for varying the period of rotation from one revolution in two seconds to one per hour. Using the kymograph in conjunction with other apparatus, tracings are obtained showing the form and time elements of the different movements of

the body (cardiac, respiratory, muscular, etc.), and measurements are made of the rate of transmission of pulse waves, nerve currents, etc. With the assistance of a tuning fork, kept in vibration electrically, and a Deprez signal (made by Verdin), these measurements are accurate to within one-two-thousandth of a second. A moist chamber (made by the Cambridge Scientific Instrument Co.), with platinum and non-polarizable electrodes, is used in the study of the properties of muscle. Other instruments are a Fleischl spectropolarimeter, a Gower's hæmacytometer, a Gower's hæmaglobinometer, a spectroscope, and a Lautenschläger oven, with automatic temperature regulator.

The apparatus for the chemical side of the subject, although in the aggregate important and costly, is composed largely of small pieces, too numerous for individual mention. Among them may, however, be named a set of Hempel's apparatus for gas analysis, and a Knop azotometer, the last used mostly in urinary analysis.

For the measurements of mass, volume, temperature, barometric pressure, specific gravity, etc., so constantly necessary in both the physical and chemical work, the laboratory is well supplied with apparatus of the best construction, including a Sartorius balance, flasks and pipettes, thermometers, hydrometers, picnometers, etc.

For illustrative purposes in anatomy and histology the department has an Auzoux manikin, a human skeleton, a series of charts, mostly histological, about a hundred and fifty histological slides, and a number of wet preparations of lower animals. Compound and simple microscopes, microtomes, and the usual accessories for histological work are also available.

Zoölogy

Zoölogy is taught in eleven courses: Three terms of major work, variously combined to form three courses, primarily for students in the school of natural science; a term of embryology for those who have taken one of the preceding courses; five courses in entomology; a year's work in comparative anatomy, zoölogical œcology, or advanced zoölogy for students specializing in that subject, and a year's work in independent investigation (senior) for those who select a zoölogical subject

for the graduating thesis. Only the first term's work is necessarily common to all students in the college who desire to make zoölogical study a prominent feature of their course. At the end of this term three divergent lines are open, one leading mainly towards entomology, a second towards physiology and medical study, and a third towards zoölogical specialties and pedagogical zoölogy.

In this department an additional course is given as general biology. It is an advanced course following upon zoölogy 10, or upon major work in zoölogy and botany.

EQUIPMENT

The equipment of the zoölogical department is contained in four students' laboratories, an instructor's laboratory, a lecture room, a private office, a store room, and a dark room for photography. It includes twenty aquaria, forty-eight compound microscopes of the best makes (Zeiss, Reicherts, Leitz, and Bausch & Lomb), Zeiss dissecting microscopes, Abbé camera — lucidas, microtomes of five patterns (Zimmerman's Minot, Cambridge, Beck-Schanze, Bausch & Lomb, and Ryder), and the usual equipment of incubators, paraffine baths, etc. A set of Blaschka glass models of invertebrates, a set of Ziegler's wax models of embryology, two hundred and fifty wall charts, and some hundreds of permanent preparations in alcohol, are examples of the equipment for the illustration of lectures. Advanced and graduate students have the privilege of the free use of the library and equipment of the State Laboratory of Natural History, which occupies rooms in Natural History Hall. They are also admitted to the privileges of the University Biological Station at Havana, Illinois, and will be given credit for regular work done there. They are thus afforded ample opportunity for prolonged original work in several departments of zoölogical science, especially in those relating to the zoölogy of Illinois. The Bulletin of the State Laboratory is open to graduates for the publication of their papers.

Entomological students have similar access to the collections and resources of the State Entomologist's office, including a well equipped insectary for experimental investigation.

THE PHILOSOPHICAL GROUP

AIMS

The philosophical group includes those sciences which deal both with man as an individual, in the mental and moral spheres, especially as these are connected with his physical being, and also with man in society. The branches of knowledge included in the group occupy a place among the divisions of biological science, and it is intended to carry the spirit of biology, in the commonly accepted sense, into the investigation of these subjects. The general aim and scope of the group is the study of the character and development of the individual and of society, of the relations of man to external nature, of the influence of natural selection on social development, and, finally, of the possible effect of artificial selection on that development, through both subjective and objective influences. In the treatment of the subjects, while their literary value is not neglected, an effort is made to arouse the scientific spirit, and to keep in close touch with the other work in the college.

Under this caption the subjects of psychology, pedagogy, economics, political science, and philosophy are offered in the College of Science as electives to all chemical and natural science students, and to all students who desire to specialize in the philosophical subjects, with studies in the physical and natural sciences as a preparation for them. All the studies of this group are junior and senior subjects, open, as a rule, to those students only who have done two years of University work.

CLASSIFICATION OF SUBJECTS

Prescribed

The same as in either the natural science or chemical group, pp. 89 and 103.

Elective

List A (Major Courses)

Economics 1 to 8; 2 to 11 credits.
Pedagogy 1 to 7; $\frac{2}{5}$ to $9\frac{4}{5}$ credits.
Philosophy 1 to 7; 1 to 6 credits.

Political Science 1 to 9; $\frac{2}{5}$ to $9\frac{2}{5}$ credits.
Psychology 1 to 9; 1 to 9 credits.

List B (Minor Courses)

Economics 1; 2 credits.
Philosophy 1; 1 credit.
Political Science 1; $1\frac{1}{5}$ credits.
Psychology 1; 1 credit.

List C

The same as in the natural science group, with the omission of philosophical subjects, p. 102.

REQUIREMENTS FOR GRADUATION

In this group, as in the natural science group, a student may pursue either a specialized or a general course. *

To graduate from the College of Science in the studies of this group, in a general course, the student must either complete the subjects of the required list in the chemical group, or must carry those of the corresponding list in the natural science group, and earn six full credits additional for major natural science studies. He must further do twelve terms' major work, or their equivalent, on subjects in the philosophical group; must take minor courses in all the philosophical subjects (except pedagogy) in which he has not completed a major course.

To graduate from this group in a specialized course the student must meet the general requirements for specialized courses, relating to thesis and amount of work required in the major subject.

Those who specialize in psychology may count all credits gained in that department, and any three earned previous to the senior year in botany 1, b, c; physiology 1, 2; philosophy 1, 8; zoölogy 3.

DESCRIPTION OF DEPARTMENTS

Economics

The instruction in this subject is based on the work of the first two years in science. The relation of the study to the

* See page 103.

biological sciences commonly so called is emphasized and kept steadily in view. In the courses in sociology the aim is to study society as an organism, to trace its evolution from primitive forms to its present complex structure, to examine the nature of its environment and its adaptation thereto, its present normal character and operations, and the forces, subjective and objective, which are at work tending to change its structure. The courses on special topics are treated as detailed studies of special organs and functions, their character as such is described, and their relations to one another and to the whole social organism are studied.

The plan of instruction combines recitations, lectures, discussions, and reports by students on assigned topics. The advanced courses are divided into two groups and given in alternate years.

Pedagogy

For an account of the scope and methods of the department of pedagogy see *Pedagogy*, in the College of Literature and Arts.

Philosophy

The work in this department includes history of philosophy, metaphysics, ethics, and logic. The object of their courses is primarily threefold:

1. To meet the wants of those students who, in junior and senior years, desire to specialize more or less in this department.
2. To give those who desire a more general knowledge of these subjects, some familiarity with the sphere of philosophical speculation and with the philosophical method as applied to the principles and presuppositions of the various sciences.
3. To show the relation of philosophy to practical life and the value of these studies as means of general culture.

The subjects are taught by lectures, recitations, and the seminary method.

Political Science

See this subject in the College of Literature and Arts.

Psychology

The aim of the work in this department is to furnish the student,largely by means of inductive study, a knowledge of the

laws according to which mind develops, and the influence of environment upon this development. In the various courses the laboratory method of instruction is used. By means of appropriate apparatus the sensations are studied experimentally and the conditions under which the various sensations arise are accurately determined. Apparatus is also employed to demonstrate the reciprocal relation that obtains between body and mind and to test and measure memory, attention, association, and other higher psychical forces. Throughout the courses an effort is made to put psychology upon an exact basis as a natural science.

The elementary forces of mentality as exhibited in infant life are carefully studied with a view to determine some of the components of the adult mind. A comparative study of the mental life of animals is undertaken with a view to throw some light upon the morphology of mind. The mental life of defectives and pathological states of mind are discussed in their relations to the normal type. The advanced laboratory work is of a nature to develop a spirit of independent research on the part of the student. The relation of psychology to the physical biological sciences is kept in view, so that the student may be assisted in his endeavor to bring the manifestations of mind and matter into a related whole.

COLLEGE OF AGRICULTURE

FACULTY

Andrew S. Draper, LL.D., President.
Eugene Davenport, M. Agr., Dean, Animal Husbandry.
Thomas J. Burrill, Ph.D., LL.D., Botany and Horticulture.
Stephen A. Forbes, Ph.D., Zoölogy.
Charles W. Rolfe, M.S., Geology.
Donald McIntosh, V.S., Veterinary Science.
Arthur W. Palmer, Sc.D., Chemistry.
Frank F. Frederick, Art and Design.
Samuel W. Parr, M.S., Applied Chemistry.
David Kinley, Ph.D., Economics.
Daniel H. Brush, Captain 17th Infantry, U. S. A., Military Science.
Henry E. Summers, B.S., Physiology.
Edgar J. Townsend, Ph.M., Mathematics.
Evarts B. Greene, Ph.D., History.
Katharine Merrill, A.B., English.
William O. Krohn, Ph.D., Psychology.
William H. VanDervoort, M.E., Mechanical Engineering.
Harry S. Grindley, Sc.D., Secretary, Chemistry.
T. Arkle Clark, B.L., Rhetoric.
Herman S. Piatt, A.M., French.
Arthur Hill Daniels, Ph.D., Philosophy.
Charles W. Tooke, A.M., Political Science.
George D. Hammond, A.B., History.
Fred A. Sager, B.S., Physics.
Frank Smith, A.M., Zoölogy.
Ralph P. Smith, Ph.B., German.
Helen E. Butterfield, M.L., Rhetoric.
Alton C. Burnham, B.S., Mathematics.
George P. Clinton, M.S., Botany.

Albert R. Curtiss, Wood Working.
George W. McCluer, M.S., Horticulture.
Henry Jones, Blacksmith.
Charles F. Hottes, M.S., Botany.
Edward J. Lake, B.S., Art and Design.
Robert K. Porter, Military.

AIMS AND SCOPE

The College of Agriculture offers a course especially strong in chemistry, botany, zoölogy, physiology, and bacteriology, in which both agriculture and horticulture are taught from a scientific basis, always with regard to successful practice. The aim is to discuss and to teach the principles that underlie these two great arts.

Besides affording special preparation for a technical pursuit, it is hoped that this course will commend itself to all lovers of rural life and its affairs in offering them the means of keeping pace with the increasing desire for higher learning and better equipment.

To give scope for individual preferences one full study is made elective after the freshman year. This insures the uninterrupted pursuit of the other two, and affords the opportunity to elect by courses, if desired.

METHODS OF INSTRUCTION

Instruction in the sciences is by laboratory work, supplemented by lectures, text-books, and reference readings. Laboratory methods are also regarded as peculiarly suited to the other subjects of the course and to the needs of those who pursue them. The effort throughout is to teach technical principles and practices in the light of the most profound truths known to science. The college takes a high position in regard to the standing of the subject and the needs of the students.

Reference readings are almost constantly prescribed in standard volumes and periodicals, with which the library is liberally supplied.

For purposes of illustration liberal use is made of experimental fields, live stock, buildings, and apparatus, as well as of the University grounds and cabinet collections.

EQUIPMENT

The student in agriculture and horticulture receives instruction in the same classes with other students of the University, and thus enjoys all the advantages of the excellent laboratories and apparatus of the science departments.

The equipment of the agricultural department has been materially increased by recent purchases of some excellent specimens of both cattle and sheep from some of the best breeders of the United States.

A small building has been fitted to accommodate a limited number of students in certain lines of dairy instruction, notably in pasteurizing, testing, separating, creaming, churning, etc.

The Agricultural Experiment Station, with a farm of 170 acres and suitable buildings, exhibits field experiments in testing the different varieties and modes of culture of field crops, and in the comparison and treatment of soils. It carries on experiments in agriculture, horticulture, dairying, and in feeding various kinds of food to animals of different ages and development. In common with similar departments in the several agricultural colleges of the country, it attempts to make positive additions to knowledge, and to further the development of agricultural science.

The extensive fruit and forest tree plantations give abundant opportunity for studies and illustrations in many horticultural lines, and add greatly to the effectiveness of class-room work.

The ornamental grounds which surround the University buildings contain about twenty acres, and are kept in neat and attractive style. These, with their trees and flowering shrubs, lawns, beds of flowers and foliage plants, walks and drives of different construction and styles, furnish illustrations for the classes in landscape gardening. A greenhouse contains a collection of plants of great value to the classes in floriculture and landscape gardening, besides furnishing students with practice in greenhouse management.

The cabinets contain a series of colored casts of fruits, enlarged models of fruits and flowers; collections of seeds of native and exotic plants, of specimens of native and foreign woods, of beneficial and injurious insects, and of specimens showing their work; numerous dry and alcoholic

specimens and preparations; maps, charts, diagrams, drawings, etc.

The College has a supply of compound microscopes and other apparatus, and students have opportunity to learn their use and to make practical investigations with them. The herbarium is rich in specimens of useful and noxious plants, including many of the fungus parasites which cause disease to cultivated crops.

CLASSIFICATION OF SUBJECTS

PRESCRIBED

Agriculture 1, 2, 3, 4, 5, 6, 9; 4 credits.
Art and Design 1, 2, and 3 or 10; 2 credits.
Botany 1, 2; 4 credits.
Chemistry 1, 3a, 4, 5a; 4 credits.
Horticulture 1, 6; 2 credits.
Military 1, 2; 2 credits.
Physics 2; 1 credit.
Physiology 1; 2 credits.
Rhetoric 2; 2 credits.
Thesis;2 credits.
Veterinary Science 2; 1 credit.
Zoölogy 3, 8; 3 credits.

ELECTIVE

Agriculture 7, 8; 2 credits.
Anthropology 1; 1 credit.
Architecture 1; 3 credits.
Astronomy 4; 1 credit.
Biology, General, 1 credit.
Botany 3, 4, 5; 6 credits.
Chemistry 5b, 5c, 13; 5 credits.
Economics 1 to 5; 2 to $5\frac{4}{5}$ credits.
English 1, 2; $1\frac{1}{5}$ to 3 credits.
French 5; 3 credits.
Geology 4, 1; 1 or 2 credits.
German 1 or 5, 2, 6; 3 to 6 credits.
History 1, 2, 3, 4, 7, 10 to 12; $1\frac{1}{5}$ to 9 credits.

Horticulture 2, 3, 4, 5; 3 credits.
Mathematics 1, 3; 2 credits.
Mechanical Engineering 2; 1 credit.
Meteorology 1; $\frac{2}{5}$ credit.
Mineralogy 1; 1 credit.
Paleontology 1; 2 credits.
Philosophy 1, 5; 2 credits.
Physiology 2, 3; 5 credits.
Political Science 1, 2, 4 to 8; $\frac{4}{5}$ to $7\frac{2}{5}$ credits.
Psychology 1, 3, 6; 2 credits.
Veterinary Science 1, 2, 3; 6 credits.
Zoölogy 4, 5; 4 credits.

REQUIREMENTS FOR GRADUATION

For the degree of Bachelor of Science in Agriculture 40 full term-credits and an acceptable thesis, are required. Of these 29 are to be obtained by pursuing prescribed studies, and 11 are to be obtained by pursuing elective studies. Three studies are to be pursued each term, besides Military 1, 2, and Rhetoric 2, when these subjects occur.

COURSE OF INSTRUCTION BY YEARS AND TERMS

The following scheme shows the terms of the year in which the various subjects are taught, and the order by years in which they should be pursued.

The subjects in *italics* are prescribed. All others are elective, but should be taken in the years and terms specified.

It will be noted that one study for each term after the freshman year is left open for the student's election. He may therefore elect by courses and enjoy an uninterrupted pursuit of the same from term to term.

It should be further noted that at the opening of the third year an opportunity is presented for choice between specializing in horticulture or in animal husbandry. This choice, if made, should be continued.

FIRST YEAR

1. *Agriculture* 1, 2; *Horticulture* 1; Art and Design 1, 2, and 3 or 10; *Chemistry* 1; *Military* 1, 2; Rhetoric 2.

2. *Agriculture* 9; Art and Design 2; *Chemistry* 3a; *Military* 1, 2; Rhetoric 2.
3. *Agriculture* 1; *Horticulture* 1; *Chemistry* 4; *Military* 2; one elective; Rhetoric 2.

SECOND YEAR

1. *Botany* 1; *Chemistry* 5a; *Military* 2; elective.
2. *Botany* 1; *Zoölogy* 3; *Military* 2; elective.
3. *Botany* 1; *Zoölogy* 8; *Military* 2; elective.

THIRD YEAR

1. *Agriculture* 4; Zoölogy 3, or Horticulture 2; elective.
2. *Physics* 2; *Physiology* 1; Horticulture 3; elective.
3. *Agriculture* 6; *Physiology* 1; Horticulture 5; elective.

FOURTH YEAR

1. *Botany* 2; *Agriculture* 3, or *Horticulture* 6; elective.
2. *Thesis;* Veterinary Science 2; Botany 3; elective.
3. *Thesis; Agriculture* 5, or Botany 4; elective.

WINTER SCHOOL IN AGRICULTURE

For the winter term students are admitted without entrance examination to a special short course in which there are daily lectures and class exercises on some of the most important practical branches of agriculture, horticulture, and veterinary science. This course is designed for young men already engaged in agricultural pursuits who cannot spend a long time in college, and yet are anxious to make the most of themselves and of their vocation. Such students have access to the library and museum collections of the University, and have admission to the courses of general lectures.

The details of this course vary from year to year. A special circular, giving full information concerning it, is issued each year several weeks before the opening of the winter term.

GRADUATE SCHOOL

AIMS

It is the purpose of the graduate school to encourage advanced study and research at the University, and to promote high scholarship on the part of those who have completed an undergraduate course of instruction.

ORGANIZATION

The graduate school is in charge of the Council of Administration of the University. The Council fixes the conditions of admission, approves the courses of instruction, prescribes the character of examinations, establishes requirements for degrees, and exercises general supervision over all the affairs of the school. The dean of the general faculty is the executive officer of the school, and he should be consulted on all matters pertaining thereto.

ADMISSION AND REGISTRATION

Graduates of this University, and of other colleges and universities of approved standing, may be admitted to membership in the graduate school upon presentation of their credentials. Other persons suitably qualified may gain admission by special vote of the Council of Administration upon such conditions as may be imposed in each case. Candidates for admission register with the dean of the general faculty, at the beginning of each academic year, during the registration period preceding the commencement of instruction for the year in the University.

Non-residents may register by securing blanks, which are sent on application, and returning them properly filled out not later than the time specified. Correspondence in this case should be commenced early that no delay in registration may occur.

Registration may be accepted at other times, but the time-limit required for degrees counts from the date of registration. In all cases one registration covers an academic year or such fractional part thereof as then remains. A graduate student who desires to be absent from the University during any part of the year for which he is registered, must obtain from the dean of the general faculty a certificate of permission covering the period of absence.

Admission to the graduate school is indicated by a certificate issued to each successful candidate by the dean; this certificate must be presented to the business agent for his signature, and, if the holder is not already matriculated in the University, must be accompanied by the required fee. The certificate properly signed is to be shown to the head of each department in which instruction is sought.

With the exceptions named below, all members of the graduate school are required to be in regular attendance at the University, and to do all the work for which they are registered in the departments to which such work belongs. In case of absence on leave, or when absence is necessary to carry on investigations included in approved courses of study, the requirement of continuous residence may be modified by the Council of Administration. Graduates from baccalaureate courses of this University may register as non-resident members of the graduate school; and all members of the school who have completed the residence period required for advanced degrees may register as non-residents while completing the work required for such degrees.

STUDIES AND EXAMINATIONS

As far as can be indicated by a statement of time, full work for a graduate student consists in the use of forty five hours a week in the lecture rooms, laboratories, etc., and in private study. Assignments of work are made upon this basis; but great variations naturally result from the subject-matter in hand, and from the abilities of individuals. Each student must select one principal line of study, called his major subject, and upon this major subject at least one-half of his work must be done; and any greater proportion of his time, up to the whole of it, may be thus devoted if proper approval is had.

When work upon the selected major subject is not arranged to require all of the student's attention, he must choose one or two minor subjects, as may be necessary to complete a full course of study. Usually, at least one minor subject should be taken. Not more than two may be taken at any one time.

The major study must be approved as graduate work for this University. The minor subjects may, under approval, be chosen from the offerings to graduates, or, except in the College of Engineering, from undergraduate courses exclusive of those usually open to freshmen. But all candidates for advanced degrees must direct their selection towards some well-defined end, determined for the most part by the character and purpose of the major study.

In architectural and engineering subjects, at least the major line of study, and not less than two-thirds of the entire work, must be taken from lists marked "primary,"* and any remaining amount to complete a full course may be taken from those designated "secondary," under the same head with the primary list.

All courses of study leading to degrees in the graduate school are subject to approval: first, by the head of the department of the University in which the major subject for each student belongs; second, by the dean of the college including such department; and third, by the dean of the general faculty. The latter officer reports to the Council of Administration for final action. The signatures of the heads of departments in which chosen minor subjects belong must also be obtained before the list reaches the dean of the general faculty. The lists of studies, as finally approved, are deposited with the registrar of the University. No changes may subsequently be made except under the same line of approvals, but extension of time may be arranged with the professors concerned and with the dean of the general faculty.

Examinations are required in all subjects, and reports upon these are made to the registrar of the University. Graduate students in undergraduate classes are examined with these classes.

The head of each department in which a student does his major work is charged with the direction and supervision of

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*See the courses for graduates in architecture and engineering, in the description of courses.

such major work, and, in a general way, with the supervision of the student's entire course of study. He fixes the time and method of all examinations not otherwise provided for, sees that they are properly conducted, and reports results to the registrar. It is his duty also to keep the dean of the general faculty informed concerning all matters affecting the interests of the student, and of the school in connection therewith.

DEGREES AND FELLOWSHIPS

[See pp. 216-219.]

THE SCHOOL OF PHARMACY

The Chicago College of Pharmacy, which was formally united with the University May 1, 1896, will henceforth be conducted as the technical *School of Pharmacy* of the University of Illinois.

Organized in 1859 as the Chicago College of Pharmacy, this was the first institution for pharmaceutical education established west of the Alleghanies, and the third in the United States. The war caused for a time the discontinuance of instruction, and shortly after the resumption of its activities the great fire swept it out of existence, so that the present establishment dates from 1872.

Noted European savants moved with sympathy for the sufferers by the great conflagration, and actuated by interest in the cause of pharmaceutical education, presented the trustees of the institution a valuable outfit of apparatus, specimens and library, and it is from this nucleus that the school equipment has grown to its present excellent proportions.

In the diploma awarded to this school by the World's Fair Commissioners July 14, 1893, the Library is referred to as "a collection of rare and very valuable books, printed in the 16th, 17th and 18th centuries, including the works of Galen, published in Venice in 1556, and the entire volumes of the Edinburgh Dispensatory."

The School is situated near the business center of Chicago, at numbers 465 and 467 State Street, and occupies a building which was erected especially for its use. The lecture amphitheater, *Attfield Hall*, has seats for six hundred ; the chemical and pharmaceutical laboratories, as also the microscopical laboratory and the dispensing laboratory, are commodious and well appointed.

The *Courses of Instruction*, covering two terms of twenty-five weeks each, extending from October 2, to April 23, afford opportunities for a thorough technical training, such as

is necessary for the successful practice of pharmacy. The subjects taught are Pharmacy, Chemistry, Botany, Materia Medica, Pharmacognosy, Physics.

The instruction is by lectures, illustrated by experiments, specimens, charts, etc., oral quizzes and recitations, written examinations and laboratory practice.

Admission

Any person at least 16 years of age who presents satisfactory evidence of such preliminary education as can be gained in the public Grammar School, may be admitted.

Graduation

The degree of Graduate in Pharmacy will be conferred upon such persons as are 21 years of age, have satisfactorily completed the work of two full terms and have had four years practical experience in pharmacy, including the period of attendance at the Pharmacy School.

Advanced Courses in Pharmacy and Chemistry and the involved and allied sciences are provided at the University in Urbana, and lead to graduation with the degree of Bachelor of Science in Pharmacy and Chemistry.

The requirements for admission to these advanced courses are the same as for other University courses.

For requirements for graduation, see page 93.

Persons competent to fulfil the general requirements for admission to the University may be granted credit upon the University courses for equivalent work satisfactorily completed at the School of Pharmacy.

For further information, see special announcement.

GENERAL DESCRIPTION OF COURSES

Following the description of each course of instruction will be found the necessary requirements, if any, for admission to that particular course. Careful attention must be given to these requirements and to the sequence of studies thus indicated. For instance, under Astronomy 2, for students of the College of Engineering, page 144, there are required "Mathematics 4;" "Physics 1 and 3;" "Theoretical and Applied Mechanics 1." Turning now to these subjects, it is found that Mathematics 4 is Trigonometry, Physics 1 is the major course of one year, and Theoretical and Applied Mechanics 1 is Analytical Mechanics. All these subjects must be satisfactorily passed before admission may be had to the class in astronomy.

In case a course not required for graduation is selected by less than five students, the right to withdraw the same for the term is reserved.

Graduate courses of instruction are described under the various subjects (pp. 132ff.) as an aid in the selection of studies by graduate students. They are numbered from 100 upwards. Other courses may often be arranged by the professors in charge to meet the special requirements of students. The subjects in which courses are announced for 1896–97 are as follows:

Agriculture, Architecture, Botany, Chemistry, Civil Engineering, Danish Language, Economics, Electrical Engineering, French, Geology, Greek, History, Latin, Mechanical Engineering, Municipal and Sanitary Engineering, Pedagogy, Philosophy, Psychology, Theoretical and Applied Mechanics, Zoölogy.

AGRICULTURE

1. Crops.—A study of crop production on fertile lands. A brief survey of the crops of the United States, followed by

a detailed study of methods employed in securing yield aside from questions of fertilizers or fertility. The selection of varieties suited to the locality and their improvement; the seed, its pedigree and vitality; the conditions of its germination, and the influence of successful or unsuccessful germination upon aftergrowth of the plant; the physical conditions of growth—moisture, heat, and light—and how these conditions may be influenced by cultivation, by drainage, or by irrigation. This course leads to a study of the special culture of particular crops, and of the machinery of cultivation and of harvesting, and prepares the way for the subsequent study of fertility and the more critical study of soils. *Fall and spring terms, two-fifths study.* ———.

2. Breeds of Stock.—An outline of the principal characteristics of the improved breeds, with some critical study of the animal form as an index of quality, and of the types of the more prominent breeds. Instruction is by outline lectures, reference reading, and by practice in judging at the yards. Introductory to the study of stock breeding. Practicum once a week on Saturday. *Fall term, one-fifth study.* Professor Davenport.

3. Stock Breeding.—Variation, its extent and importance, both in nature and under domestication. How far inherent and how far induced by environment. Acquired characters and their inheritance. Correlated variation. Selection. Survival of the fittest. Possibility of fixing favorable variations. Effects of use and disuse. Intercrossing, first as stimulating, afterwards as eliminating variations. Hybridism. Grading and its benefits. Breeding in line and inbreeding. Instinct and intelligence. The aim is to bring every known principle of reproduction to the assistance of the breeder's art, and to study the methods of successful breeders and their results. Lectures, reference reading, and practice in comparisons of individuals, and, as far as possible, of families and herds. *Fall term, full study*, Professor Davenport.

4. Fertility.—Influence of fertilizers on the amount, character, and composition of crops. Effect of particular crops upon fertility and upon each other, when grown in succession or together. Nitrogen and leguminous crops. Residues, or the fate of fertilizers. The foregoing is made a basis for the study of conservation of fertility by the rotation of crops that

the residues of one crop may be saved by the next and not washed away, and is followed by a detailed study of rotations. Economic sources of the elements of fertility; fertilizers, and manures, their valuation and use under both extensive and intensive methods. *Fall term, full study.* ———

Required: Botany 1; Chemistry 1, 3a, 4.

5. Stock Feeding.—Functional activities of the animal body and the end products of their metabolism. Foods are considered, first chemically, as affording the materials for these activities whether in construction of body tissues or of animal products, as meat, milk, etc.; second dynamically, as supplying the potential energy for these processes, and for labor, speed, etc. Preparation of foods, their palatableness and digestibility. This knowledge is used as a basis for calculating how the feeding practices of any locality may be adjusted to the consumption of the crops most successfully grown in that region, that domestic animals may become and remain, essentially, consumers of coarse crops and by-products. *Spring term, full study.* Professor Davenport.

Required: Botany 2; Physics 2; Physiology 1; Zoölogy 3.

6. Soils.—The structure and fertility. A critical study of the processes, chemical, physical, and biological that are active within the soil, especially the physical. Drainage waters as compared with fertilizers applied, herbage produced, and rainwater fallen. Fertility and barrenness, indications, causes, and treatment. Different kinds of soil and their relations to moisture and to heat. Cumulative effect of various agricultural practices. Agency of bacteria in soil transformations and the conditions of their activities. Creation of soils and their fertility and the ultimate effect of their cultivation. *Spring term, full study.* ———

Required: Botany 1; Chemistry 1, 3a, 4; Zoölogy 3, or Botany 2.

7. Comparative Agriculture.—Influence of locality, climate, soil, race, customs, laws, religion, etc., upon the agriculture of a country and incidentally upon its people. One crop only and its effect, as rice; Indian corn in American agriculture and affairs. Varying conditions under which the same

crop may be produced, as wheat. Statistical agriculture. Influence of machinery and of land titles, whether resting in the government, in landlord, or in occupant. Relation of agriculture to other industries and to the body politic. The agriculture of the world, its history and development. *Spring term, full study.* Professor DAVENPORT.

8. AGRICULTURAL EXPERIMENTATION.—A systematic study of the work of Experiment Stations and experimenters in this and other countries, together with a critical study of correct principles and methods of experimentation, especially designed for such students as desire to fit themselves for work in original investigation in Experiment Stations or elsewhere. *Winter term, full study.* Professor DAVENPORT.

Required: Agriculture 4, 6.

9. DAIRYING.—Studies and practice on milk and its manipulations, including testing, separating, creaming, churning, etc., together with care of surroundings and the elements of successful manufacture of dairy products. *Winter term, full study.*

10. INVESTIGATION AND THESIS.—There is required for graduation two terms of original investigation, the results and methods of which are to be embodied in the form of an acceptable thesis. The student may choose his subject along the line of any of the required studies of the course. The selection should be made before the opening term of the last year.

COURSES FOR GRADUATES

101. BREEDING.—Variation and heredity, their nature and phenomena as influenced by selection, environment, and use, with special reference to improvement of domestic animals.

102. PHYSIOLOGICAL CHEMISTRY AND THE NATURE OF FOOD.—A study of the functional activities of the animal body and the end products of their metabolism, as a basis for economical feeding.

103. COMPARATIVE AGRICULTURE.—The principles and practices of agriculture as influenced by soil, climate, tradition or the political, social, or religious condition of men.

ANTHROPOLOGY

1. This course, in general anthropology, begins with a study of the physical and psychical elements of ethnography. Theories as to the origin of man are discussed, and the various races of mankind are distinguished and described. Special attention is given to the historical and comparative study of customs, ceremonies, and rights, beliefs, and folklore of primitive peoples with reference to the common characteristics and fundamental instincts of mankind and to the origin and growth of existing customs and social institutions. Lectures and prescribed reading. *Winter term, full study.* Assistant Professor DANIELS.

Required: A major or minor course in Economics, Geology, Psychology, or Zoölogy.

ANTHROPOMETRY

1. This is a short course of lectures and reading under the direction of the professor of physical training. It treats of physical measurements and their application in various departments of anthropological investigation. The time at which the lectures are given is subject to arrangement between the professor and students. For students in sociology (Economics 7 or 7a), the course will be counted for $\frac{1}{5}$ of a credit. Assistant Professor EVERETT.

ARCHITECTURE

1. [Replaced with Mechanical Engineering 1].

2. WOOD CONSTRUCTION.—Formulæ and data for computing the dimensions and strengths of columns, rods, beams, girders, etc., of wood or metal are first given and then applied in the solution of numerous examples. The kinds of wood and their uses in construction and decoration, their seasoning, shrinkage, defects, and modes of protection from decay, are next studied. The construction and design of wooden floors, walls, ceilings, and roofs are then treated, and afterwards joinery, comprising doors, windows, bays, inside finish, cornices, wainscoting, etc. The construction and design of stairs of the various types terminate the work of the term. About twenty

problems are worked out on as many plates by the student. *Ricker's Wood, Stone, Brick, and Metal Construction; Jones's Logarithmic Tables. Fall term, full study.* Mr. McLane.

3. Stone, Brick, and Metal Construction.—Foundations of stone, brick, concrete, and on piles, are first studied, then the materials employed in stone masonry, their uses, defects, qualities, and mode of preparation. Kinds of masonry and external finish. Tools for stone cutting and methods of using them. The preparation of working drawings is illustrated by practical applications in the study of the arch, the vault, and the dome. Brick masonry is next examined, with its materials and bonds, and several examples are drawn. The manufacture and refining of cast iron, wrought iron and steel are then studied, together with the processes of pattern making, molding, casting, refining, rolling, etc., as well as the stock or standard dimensions or sections to be obtained in the market. The special properties and value of each metal in a structure, the designing of a line of columns in a tall mercantile building, and of beams and girders, together with the study of joints and connections completes the work of the term. About twelve problems are drawn on the same number of plates. Same text-books as in fall term. *Winter term, full study.* Mr. McLane.

Required: General Engineering Drawing 1, 2, 3, 4.

4. Sanitary Construction.—Daily recitations or special lectures, with designs for special problems. The study of plumbing, trap ventilation, removal of wastes, construction of water closets, drains, and systems of water supply; sewage disposal. Hot water supply and fixtures in dwellings. *Gerhard's Drainage and Sewerage of Dwellings; Lectures on Sewage Disposal. Spring term, full study.* Mr. McLane.

Required: Math. 4; Physics 1, 3.

5. Roofs.—This term is devoted to the elements of graphic statics, and to the applications of the science in the designing of trussed roofs. The composition and resolution of forces, equilibrium, reactions, moments, bending moments, and shears on beams, centre of gravity, and moment of inertia of any form of cross section, are first examined. The construction of wooden and of metallic roofs is next studied, then the mode of

computing permanent and temporary loads on roof trusses, of obtaining end reactions, of drawing strain diagrams, determining sectional dimensions of members, and ending with the designing of joint connections. Numerous problems are solved, five different types of trusses are usually worked out, complete designs and details being made for one of wood and another of iron or steel. *Ricker's Trussed Roofs. Ricker's Notes on Graphic Statics. Spring term, full study.* Mr. McLane.

Required: Math. 2, 4, 6; Theoretical and Applied Mechanics 1, 2, or 4, 5; Architecture 2, 3, 4 (except for students in civil and municipal engineering courses).

6. History of Architecture.—Two terms' work, usually divided at the beginning of the Romanesque style. Commencing with the Egyptian and ending with the modern styles, a careful study is made of each of the more important styles, successively examining the historical conditions, the local and inherited influences, the structural materials and system, the special ornaments, and the purposes and designs of the buildings, with an examination of a few of the most important typical examples of the styles. Especial attention is given to any ideas that might be useful or suggestive in American work, and to tracing the gradual evolution of architectural forms. This study, therefore, becomes a very interesting branch of the history of human civilization. Two recitations and two illustrated lectures per week. References are made to numerous works, especially to Fergusson, Lubke, Durm, Reber, Gailhabaud, etc. *Ricker's Notes on History of Architecture. Fall and winter terms, four-fifths study.* Professor Ricker.

Required: Architecture 2, 3, 4, 8.

7. History of Architecture (Details).—Exercises in drawing at large scale the most important details of the Grecian, Roman, Early Christian, Byzantine, Mohammedan, Romanesque, Gothic, and Renaissance styles. Weekly illustrated lectures in addition to drawing. *Notes and Sketches. Spring term, four-fifths study.* Professor Ricker and Mr. Gunn.

Required: Architecture 2, 3, 4, 6, 8, 20.

8. Architectural Drawing.—The term is devoted to the Five Orders of Architecture, and to Shades, and Shades

and Shadows. A careful study of the proportions and details of the Orders is first made with recitations and blackboard sketches from memory. Applications are made in a number of studies composed from Vignola, and these are rendered in ink or wash, after the shadows cast by direct and reflected light have been found. The especial purpose of this study is to prepare students for Arch. 9. *Vignola's Five Orders* (complete edition with translation); Notes and References for Shades and Shadows. *Spring term, full study.* Mr. GUNN.

Required: Gen. Eng'g Drawing 1, 2, 4.

9. ARCHITECTURAL DRAWING—(Monthly Problems).—An entire day in each month during the Sophomore and Junior years will be devoted to a single problem in design, usually requiring the use of the Orders. The program will be made known at the beginning of the exercise, and the sketches must be completed and rendered in shade and color during the same day. A satisfactory grade in each exercise must be attained by the student before credit is given for this study, and this will only be done after the completion of this course. *Once a month, fall, winter, and spring terms, two years, 1 credit.* Assistant Professor WHITE, Mr. McLANE, Mr. GUNN.

Required: General Engineering Drawing 1, 2, 3, 4; Architecture 8.

10. ARCHITECTURAL DRAWING—(Office Work).—Instruction in this study will be given in connection with Architectural Designing (Arch. 16).

11. ARCHITECTURAL SEMINARY.—Reports and discussions of original investigations of assigned topics, especially in the History of Architecture; reviews of books, abstracts of current technical journals, and other publications. *One session weekly during junior year.* One-fifth study. Taken with Arch. 6 or 7. Professor RICKER.

The seminary equipment will also be used by seniors in the preparation of theses, and by graduates for advanced work.

12. SUPERINTENDENCE, ESTIMATES, AND SPECIFICATIONS. This study comprises several specialties in office work, not otherwise provided for, so far as they can be taught in a professional school. One-third the time is devoted to superin-

tendence, one-half to estimates, and the remainder to specifications, contracts, etc.

Clarke's Building Superintendence is carefully read with daily recitations. *Clarke's Architect, Owner, and Builder before the Law.*

In estimates the purpose of the instruction is to impart a knowledge of the usual methods of measurement of materials and work, the arrangement of computations in proper and convenient order, and an acquaintance with approximate prices of materials and labor, which vary in different localities. The methods of squaring, of cubing, of units, and of quantities, are each employed and illustrated by numerous examples.

In specifications, practice is obtained by writing out a complete set for a building.

Dietzgen's Specification Blanks are employed. The standard *Contract of the American Institute of Architects* is used, being first carefully studied, then filled out for the same building. Bids, certificates, and other papers are made out. *Ricker's Lectures on Estimates. Vogdes' Price Book. Winter term, full study.* Assistant Professor WHITE.

Required: Architecture 2, 3, 4, 5, 6, 8, 16; Theoretical and Applied Mechanics 1, 2, or 4, 5.

13. HEATING AND VENTILATION.—A full knowledge of the scientific theory and of the practice of warming and ventilating buildings is the purpose of this study. Commencing with the fuels and the production of heat, the student passes to the flow of gases through ajutages and pipes, applying these data to the calculation of the dimensions of air ducts and chimneys. The different systems of heating by furnaces, hot water, steam, etc., are next examined, with the details of each. The sources of impurity in the air and the requirements of good ventilation are then considered, with the different methods of ventilation by aspiration, by fans, etc., ending with the study of fans of different types. Numerous problems are given. *Carpenter's Heating and Ventilating Buildings. Fall term, full study.* Assistant Professor WHITE.

Required: Mathematics 2, 4, 6; Architecture 2, 3, 4; Physics 1, 3; Chemistry 1; Theoretical and Applied Mechanics 1, 2, or 4, 5.

14. ARCHITECTURAL PERSPECTIVE.—The theory of perspective is taught, with all labor saving methods of abbreviating

the labor, and designing in perspective itself is made a special aim, this power being very useful to a draughtsman in preparing sketches for clients. Methods of diagonals by triangles, and by coördinates are all used. Problems in angular, parallel, vertical, and curvilinear perspective, as well as in perspective shades and shadows, are solved, requiring original work as far as possible, so as thoroughly to prepare the student for any kind of work in perspective, instead of restricting him to the study and use of a single system. Six problems are worked out on as many plates. *Ware's Modern Perspective. Winter term, full study.* Mr. Gunn.

Required: General Engineering Drawing 1, 2, 3, 4; Architecture 2, 3, 4, 8, 16, 20.

15. Requirements and Planning of Buildings.—The lectures will be fully illustrated by plans sketched on the blackboard, which must be embodied in students' notes. Problems in planning will be given, and these are to be worked out in rendered drawings, or as otherwise directed. References will frequently be made to the University library and the architectural cabinet. *Winter term, full study.* Assistant Professor White.

Required: Architecture 2, 3, 4, 8, 16.

16. Architectural Designing—(Residences).—Practice in office methods of preparing drawings and in the design and the study of the requirements for dwellings are the object of this study. The work is limited to residences, since this class of buildings is likely to afford the graduate his first opportunity for independent original work. The designing of a convenient, attractive dwelling, to cost a limited amount, is really a very difficult problem, requiring more time and thought than any other building of equal cost. Lectures with blackboard sketches to be copied in students' notes. Problems in design worked out in rendered drawings. *Gibson's Convenient Homes. Fall term, full study.* Assistant Professor White.

Required: Architecture 2, 3, 4, 8, 20.

17. Architectural Designing—(Problems).—Each student makes sketches at small scale for assigned problems, which are criticised and modified until approved, then worked out in plans, elevations, and details, these drawings being

rendered in shade or color as required. The object is to obtain as much practice in original design as possible; and in the making of rapid and effective sketches, suitable for submission to a client or employer. *Full term, full study.* Assistant Professor WHITE.

Required: Architecture 2, 3, 4, 6, 7, 8, 9, 11, 15, 16, 18, 20.

18. ESTHETICS OF ARCHITECTURE.—The laws of correct design, so far as these may be formulated in words, are illustrated by the study of numerous examples. Commences with the study of the nature and mode of working the different materials used for structural and ornamental purposes, deducing the proper ornamental treatment for each, then taking up the proper decoration of walls, ceilings, and roofs. The general principles of ornamentation are next applied to flat surfaces and to solids of various shapes. A full study of the various materials used in furniture, art works, etc., is then made, with suggestions for their proper use in the art industries. About twenty problems in original design are rendered on as many plates. *Ricker's (abridged) Translation of Redtenbacher's Architektonik; Meyer's Handbook of Ornament. Spring term, full study.* Professor RICKER.

Required: Architecture 2, 3, 4, 6, 8, 14, 16, 20.

19. ARCHITECTURAL ENGINEERING.—This continues the study of graphic statics, commenced in Roofs, with applications to metallic roofs of wide span, roof trusses of curved or unusual form, and those supported by abutments and jointed. Spherical and conical trussed domes. Effect of moving loads on girders, the graphical analysis of the arch, vault, and dome, and of the Gothic system of vault and buttress. Construction and details of steel skeleton buildings. Practical applications are made to a series of problems in design for specified cases. *Ricker's Notes on Advanced Graphics; Freitag's Architectural Engineering; Ricker's Translation of Wittman's Arch and Vault.* References to the works of Planat, Landsberg, DuBois, Clarke, Ott, Levy, Muller-Breslau, etc.; on Graphic Statics. *Spring term, full study.* Assistant Professor WHITE.

Required: Math. 2, 4, 6; Theoretical and Applied Mechanics 1 and 2, or 4 and 5; Architecture 2, 3, 4, 5.

20. ARCHITECTS' ART COURSE 1, Prescribed.

Any three of Art and Design 1, 2, 3, 5, 6, 13. *Fall, winter, and spring terms.* Professor FREDERICK.

21. ARCHITECTS' ART COURSE 2. Optional.

Any three of Art and Design 5, 6, 7, 8, 10, 11, 13. *Fall, winter, and spring terms.* Professor FREDERICK.

Required: Architecture 20.

The Art and Design courses offered as Architecture 20 and 21 are varied to meet the special needs of students of architecture.

22. RENAISSANCE DESIGN.—*Fall term, full study.*

23. GOTHIC DESIGN.—*Winter term, full study.*

24. ROMANESQUE DESIGN.—*Winter term, full study.*

In each of these three courses a prescribed series of tracings of important details are to be made. and a single problem in design will be worked out as fully as time will permit. To acquaint the student with the methods of construction and motives in design peculiar to the style, a course of lectures will be given during each term. These will be fully illustrated by stereopticon views and blackboard drawings. A second term of work in Architecture 23 will be accepted in lieu of Architecture 24 or 25. Professor RICKER and Assistant Professor WHITE.

Required: Architecture 2, 3, 4, 6, 8, 9, 11, 14, 15, 16, 18, 20.

These three courses, 23 to 25 inclusive, are not regularly offered and will be taught during the year 1896–97 by special arrangement only.

25. COMPOSITION OF ORNAMENT.—This term is devoted to daily exercises in the designing of architectural ornament to decorate the structural forms usually found in architectural practice. These designs will be charcoal or crayon sketches, drawings rendered in shade or color, or finished drawings. They will be made on as large a scale as possible, usually full size. *Spring term, full study.* Professor RICKER and Assistant Professor WHITE.

Required: Architecture 2, 3, 4, 5, 6, 7, 8, 9, 11, 14, 15, 16, 18, 20, 21, 22, 23, 24.

This study is not regularly offered and will be taught during the year 1896–97 by special arrangement only.

COURSES FOR GRADUATES

PRIMARY

101. Construction of Extensive Wooden Buildings, 1, 2, or 3 credits.

102. Recent Uses of Stone, Brick, and Terra Cotta in Architecture, 1, 2, or 3 credits.

103. Metallic Skeleton Buildings, 1, 2, or 3 credits.

104. Fire-resisting and Fire-proof Buildings, 1, 2, or 3 credits.

105. Sanitation of Public and Semi-public Buildings, 1, 2, or 3 credits.

106. Researches on the Evolution of Architectural Styles, 1, 2, or 3 credits.

107. Higher Application of Graphic Statics, 1, 2, or 3 credits.

108. Heating and Ventilation of Large Buildings, 1, 2, or 3 credits.

109. Higher Studies in Architectural Design, 1, 2, or 3 credits.

110. Researches and Experiments in Applied Esthetics, 1, 2, or 3 credits.

111. Translation of an Approved Technical Architectural Work from the French or German, 1, 2, or 3 credits.

SECONDARY

112. Stereotomy Applied to American Problems, 1 credit.

113. Examinations of Heating and Ventilation of Buildings, 1, 2, or 3 credits.

114. Higher Workshop Practice, 1 credit.

115. Photography for Architects, 1 credit.

116. Methods of Reproducing Drawings, Specifications, etc., for Architects, 1 credit.

117. Higher Problems and Methods in Perspective, 1 or 2 credits.

118. Practice in Estimates, Specifications, etc., for Large Buildings, 1, 2, or 3 credits.

119. Higher Industrial design, 1 or 2 credits.

120. Advanced Water-color Painting, 1 credit.

121. Study of Office Methods and Arrangements, 1 credit.

122. Any primary offered in the College of Engineering, 1 credit.

ART AND DESIGN

1. Free-Hand Drawing.—Lectures on free-hand perspective and practice in drawing geometric solids. Principles applied by drawing groups of common objects, as books, vases, chairs, tables, etc., casts of ornament; interiors, as the corner of the room; plants and flowers from nature. *Frederick's Notes on Free-Hand Drawing. Fall, winter and spring terms, full study.* Mr. Lake.

2. Chiaroscuro.—Study of chiaroscuro in charcoal, crayon, ink, pencil, and water color (monochrome) of geometric solids, still-life, casts of ornament, details of the human face and animal forms. Working Drawings of Ornament. *Winter and spring terms, full study.* Professor Frederick and Mr. Lake.

Required: Art and Design 1.

3. Artistic Anatomy.—Artistic anatomy of the human figure. Drawing from Rimmer's Art Anatomy and Julien's Études d'Après l'Antique. Outline drawing from the antique figure. *Duval's Artistic Anatomy. Spring term, full study.* Professor Frederick.

Required: Art and Design 1, 2.

4. The Antique.—Shaded drawings in charcoal or oil from the antique figure. Sketching from costumed model. *Spring term, full study.* Professor Frederick.

Required: Art and Design 1, 2, 3.

5. Pen Drawing.—Work with pen and ink arranged to suit the needs of students from all departments. *Fall term, full study.* Professor Frederick and Mr. Lake.

Required: Art and Design 1.

6. Modeling.—Modeling in clay (*a*) details of human face, (*b*) copy of cast of ornament, (*c*) ornament from photograph. Casts are made of (*a*) at least one modeled piece, (*b*) arm, hand, or foot from nature, (*c*) foliage, fruit, or vegetable from nature. *Fall term, full study.* Professor Frederick.

Required: Art and Design 1, 2.

7. Advanced Modeling.—Modeling: (*a*) bas relief from antique figure, (*b*) anatomical rendering of an antique figure, (*c*) bust from the antique, (*d*) portrait head from nature in the

round or relief. Casting: (*a*) piece mould, (*b*) sulphur mould, (*c*) gelatine mould. *Fall term, full study.* Professor FREDERICK.

Required: Art and design 1, 2, 6.

8. OIL PAINTING.—This course of painting in oil color is designed for beginners, and consists of two parts: (*a*) study in monochrome from still-life; (*b*) group, as a study for composition and color. *Winter term, full study.* Professor FREDERICK.

Required: Art and Design 1, 2, 3.

9. ADVANCED OIL PAINTING.—This is a continuation of course 8. It comprises a careful study of the methods followed in landscape painting. A number of time sketches of still-life are required. *Winter term, full study.* Professor FREDERICK.

Required: Art and Design 1, 2, 3, 8.

10. WATER-COLOR PAINTING.—Painting in water-color: (*a*) group, as a study for composition and color; (*b*) sketching from nature. *Spring term, full study.* Professor FREDERICK.

Required: Art and Design, 1, 2.

11. THEORY OF COLOR.—In this course the student takes up the study of color as a means of interior and exterior decoration. Several original problems are required. *Winter term, full study.* Professor FREDERICK.

Required: Art and Design 1, 2.

12. RELATION OF DESIGN TO MANUFACTURE.—This is primarily a course in industrial design arranged for special students of that subject. *Spring term, full study.* Professor FREDERICK.

Required: Art and design 1, 2, 3, 10, 11.

13. ARCHITECTURAL RENDERING. — This course is intended primarily for students of architecture. Perspectives are rendered in water-colors, and buildings sketched from nature. *Frederick's Architectural Rendering in Sepia. Spring term, full study.* Professor FREDERICK.

Required: Art and Design, 1, 2.

ASTRONOMY

1. CELESTIAL MECHANICS.—This course will include a study in detail of some of the principles and laws of analytical

mechanics as applied to the solution of astronomical problems. More specifically, it will consider the following and other similar subjects: motion of a particle in space under the action of central forces; determination of paths when the laws of force are given; determination of orbits, masses, etc., of the heavenly bodies. So far as is possible all computations are based upon data taken by the student. *Watson's Theoretical Astronomy. Winter term, full study.* Associate Professor Myers.

Required: Theoretical and Applied Mechanics 1.

2. Descriptive Astronomy.—For students of the College of Engineering. This course comprises the subject matter of course 1, and, in addition, some of the fundamental principles of celestial mechanics. Astronomy is here taught with a view to its utility rather than as a matter of general information. Students are required to work out problems in latitude and longitude, to deduce from the principles of mechanics formulæ for weighing the masses of the heavenly bodies against one another, to solve problems involving corrections for parallax, refraction, dip of the horizon, and to determine mathematically the distances, dimensions, and orbits of the bodies of the solar system. When weather permits, the equatorial telescope is in use by students, and time is spent in the location and study of the constellations. Frequent readings are assigned on astronomical subjects of value to be found in astronomical publications in the library. Though no attempt is made to teach practical astronomy, which is taught as a specialty in civil engineering, the practical features of descriptive astronomy are kept uppermost in this course. *Young's General Astronomy. Spring term, full study.* Associate Professor Myers.

Required: Math. 4; Physics 1, 3; Theoretical and Applied Mechanics 1.

3. Mathematical Astronomy.—This course will be a continuation of the work begun in Celestial Mechanics. Considerable time must be spent in the work of the observatory. Fuller consideration will be given to these topics: the doctrine of the sphere; motions of the heavenly bodies; instrumental adjustments and methods; and various other mathematical practical features of the subject. The aim will be to

familiarize the student with the practice and the problems of the working observatory. *Watson's Theoretical Astronomy; Chauvenet's Practical Astronomy; Price's Analytical Mechanics. Fall term, 2 hours per week; winter and spring terms, 3 hours per week. This, with Mathematics 16 and 17, constitutes a full study for each term.* Associate Professor MYERS.

Required: Astronomy 1.

4. DESCRIPTIVE ASTRONOMY.—For students in Colleges of Agriculture, Science, and Literature and Arts. The aim of this course is to supply (1) a general knowledge of the facts of astronomy, (2) a clear conception of the principles underlying them, and (3) an understanding of the methods of arriving at these facts. The subjects considered are the doctrine of the sphere, the heavenly bodies, their nature, dimensions, characteristics, and the influence they exert upon one another by their attractions, radiation, or any other ascertainable cause. The most important instruments of astronomical research are explained, and during favorable weather, the sun, moon, and planets will be studied with the equatorial telescope. Methods of spectroscopic research are discussed, and, as far as possible, illustrated. Illustrative charts and lectures are also occasionally resorted to. *Newcomb and Holden's Astronomy, Advanced Course. Spring term, full study.* Associate Professor MYERS.

Required: Math. 3.

BACTERIOLOGY

[See Botany 2, p 147.]

BIBLIOGRAPHY AND LIBRARY ECONOMY

A short course of lectures on this subject will be given by the librarian to such students as elect it. Assistants in the library will usually be chosen from those who take these lectures. The time is at the convenience of instructor and students.

BIOLOGY — GENERAL

GENERAL BIOLOGY.—For those who have taken Zoölogy 10 (minor course) or a major course in either botany or zoölogy a single term of advanced general biology is arranged and

especially commended. It is intended to review, extend, systematize, and unify the student's knowledge of the phenomena, the history, and the laws of life, and of the relations of plant and animal, of living and not living matter, and of biology to the other sciences. It will be taught chiefly as a seminary subject, with occasional lectures and some study of text. It is primarily a junior or senior study. *Spring term, full study.* Professor FORBES.

Required: Zoölogy 10, or a major course in Botany or Zoölogy.

BOTANY

1. MORPHOLOGY, HISTOLOGY, AND PHYSIOLOGY.—This course extends through the year, beginning in the fall, but the first term's work will be accepted as a minor course for those not making botany a specialty. The second and third terms can not be credited separately. The full course is offered as an introduction to the methods and facts of botanical science, and, though complete in itself, is intended to serve as a foundation for further studies of plants and their affinities among themselves and their relations in nature. Laboratory and field work is supplemented and extended by lectures, the study of text, and by reference reading.

The morphology and classification of illustrative groups of plants, beginning with the lowest orders, constitute the work of the first term. Special attention is given to fresh water algæ and to fungi, but mosses, ferns, and flowering plants are included.

During the second and third terms the general histology of plants is studied alternately with experiments in vegetable physiology. The inter-relations of structure and function of organs are thus made as serviceable as possible in gaining information and in connecting cause and effect. Students examine microscopical sections, make micro-chemical tests, draw figures, and write descriptive notes. In the physiological laboratory the studies include: the extent and causes of movements of fluids in the tissues; the absorption of nutrient materials; respiration; photosynthesis; growth; sensitiveness; variation and heredity, etc. *Fall, winter, and spring terms, full study.* Professor BURRILL and Mr. HOTTES.

Required: Chemistry 1; Art and Design 1, 2.

2. Bacteriology.—Bacteria and allied organisms are now known to play exceedingly important roles in nature, and in the daily life and well-being of man. This course is an introduction to existing knowledge upon the subject, and offers instruction in the modern methods of experimentation and research. The laboratory is well equipped for a limited number of students. Only those who can give extra time, when occasion demands, should undertake the work. Lectures and assigned reading accompany the laboratory work. *Fall term, full study.* Professor Burrill and Mr. Hottes.

Required: Botany 1 or 6; Chemistry 1.

3. Systematic Botany.—There is offered in this course an opportunity for advanced work upon selected groups of plants, including the collection and preservation of specimens, the identification and description of species, and studies upon systematic affinities. The course extends through two terms, and should be taken as laid down, though there is little essential relation of sequence between the work of the two terms.

The morphology and affinities of selected orders of flowering plants, herbaria and herbarium methods, studies upon the evolution of the vegetable world, are included in the work of the first term. The second term is devoted to cryptogamic plants, and the time is largely occupied in the determination and classification of species, together with studies upon life histories. Students who propose to take this term's work should arrange with the instructor at the beginning of the year or earlier, and should make collections for themselves. Mostly laboratory work. *Fall and winter terms, full study.* Professor Burrill and Mr. Clinton.

Required: Botany 1.

4. Reproduction and Development.—Special experimental and research work in vegetable physiology, embryology, and life histories. Mostly laboratory work. *Spring term, full study.* Professor Burrill and Mr. Hottes.

Required: Botany 1.

5. Investigation and Thesis.—Facilities are offered for original investigations upon selected subjects upon which may be based a thesis required for a degree. Special arrangements should be made with the instructor during the preceding

year, or at least not later than the beginning of the year in which the work is to be taken. *Fall, winter, and spring terms, full study.* Professor BURRILL.

Required: Botany 1, 3, and 4, or an equivalent.

6. GENERAL BOTANY.—This minor course is offered to students who have but a single term to devote to botanical study. An endeavor is made to present a general view of the science and to provide an introduction to modern methods of work. Lectures or recitations, but mostly laboratory and field work. *Spring term, full study.* Mr. CLINTON.

7. PHARMACEUTICAL BOTANY.—The microscopical examination of vegetable drugs and their adulterations. Microscopy, including the structure and use of the compound microscope and the preparation of objects. Use of drawing and photographic apparatus. *Winter term, two-fifths study; spring term, three-fifths study.* Professor BURRILL and Mr. HOTTES.

COURSES FOR GRADUATES

101. BIOLOGICAL BOTANY.—The preparation and study of material by histological methods; and experiment work with living vegetation in the laboratory and field in working out special problems in the development, physiology, and pathology of plants.

102. SYSTEMATIC BOTANY.—Critical and comparative studies of species included in chosen groups of spermaphytes or sporophytes, or from selected geographic areas, in connection with considerations of genealogic development, geographic distribution, and inter-related association.

103. BACTERIOLOGY.—Investigations upon morphologic and physiologic variation due to treatment; systematic studies upon the number, validity, and relationship of species; researches upon special saprophytic or parasitic kinds of bacteria and upon methods of favoring or combating their activities.

104. EVOLUTION OF PLANTS.—Observations and Experiments upon plants and studies in related literature, in gaining information upon such topics as the following: The influence of environment, effects of self and cross fertilization, tendencies of variation, philosophy of selection, nature and laws of heredity.

CHEMISTRY

1. Elementary and Experimental Chemistry.—This course, which is designed for those who desire an elementary ge of chemistry, deals only with the fundamental, gen- ciples of the science, the few typical elements and ds which are studied being considered largely for the of illustration.

nstruction includes lecture-demonstrations, recitations, oratory exercises. The laboratory work comprises a such experiments as serve best to illustrate the rela- tween the observed facts and the general principles, amiliarize the student with the methods of chemistry. 's *Introdution to Chemistry. Fall term, full study.* r Palmer and Assistant Professor Grindley.

escriptive Inorganic Chemistry.—This course is re- of all chemical students. It is mainly devoted to a the metallic elements, their classification, compounds, mical properties. The work is from lectures and as- ext (no laboratory work). *Remsen's Advanced Course. and spring terms, three-fifths study.* Assistant Pro- rindley.

ired: Chemistry 1.

Qualitative Analysis.—This course includes a study their formation, solubilities, chemical reactions, etc. The periodic classification of the elements is made the basis for developing the principles of analysis. The work in the laboratory, after illustrating those principles, is occupied with the determination of base and acid constituents of a given number of unknown substances. *Winter term, laboratory work 2 hours daily, and lectures 3 hours per week, full study.* Professor Parr.

Required: Chemistry 1.

3b. Qualitative Analysis, continued with more complex Substances.—A comparative study of methods, difficult separations, problems in synthesis, etc. *Spring term, laboratory work 3 hours daily, full study.* Professor Parr.

Required: Chemistry 1, 2.

4. Elements of Organic Chemistry.—A course in organic chemistry, provided more especially for students who are not

year, or at least not later than the beginning of the year in which the work is to be taken. *Fall, winter, and spring terms, full study.* Professor BURRILL.

Required: Botany 1, 3, and 4, or an equivalent.

6. GENERAL BOTANY.—This minor course is offere dents who have but a single term to devote to botanic An endeavor is made to present a general view of the sci to provide an introduction to modern methods of v Lectures or recitations, but mostly laboratory and field *Spring term, full study.* Mr. CLINTON.

7. PHARMACEUTICAL BOTANY.—The microscopical ination of vegetable drugs and their adulterations. scopy, including the structure and use of the cor microscope and the preparation of objects. Use of c and photographic apparatus. *Winter term, two-fifths spring term, three-fifths study.* Professor BURR Mr. HOTTES.

COURSES FOR GRADUATES

101. BIOLOGICAL BOTANY.—The preparation of material by histological methods; and experi with living vegetation in the laboratory and field out special problems in the development, physiology, an pathology of plants.

102. SYSTEMATIC BOTANY.—Critical and comparative studies of species included in chosen groups of spermaphytes or sporophytes, or from selected geographic areas, in connection with considerations of genealogic development, geographic distribution, and inter-related association.

103. BACTERIOLOGY.—Investigations upon morphologic and physiologic variation due to treatment; systematic studies upon the number, validity, and relationship of species; researches upon special saprophytic or parasitic kinds of bacteria and upon methods of favoring or combating their activities.

104. EVOLUTION OF PLANTS.—Observations and Experiments upon plants and studies in related literature, in gaining information upon such topics as the influence of environment, effects of self and cross fertilization, tendencies of variation, philosophy of selection, nature and laws of heredity.

CHEMISTRY

1. ELEMENTARY AND EXPERIMENTAL CHEMISTRY.—This course, which is designed for those who desire an elementary knowledge of chemistry, deals only with the fundamental, general principles of the science, the few typical elements and compounds which are studied being considered largely for the purpose of illustration.

The instruction includes lecture-demonstrations, recitations, and laboratory exercises. The laboratory work comprises a series of such experiments as serve best to illustrate the relations between the observed facts and the general principles, and to familiarize the student with the methods of chemistry. *Remsen's Introdution to Chemistry. Fall term, full study.* Professor PALMER and Assistant Professor GRINDLEY.

2. DESCRIPTIVE INORGANIC CHEMISTRY.—This course is required of all chemical students. It is mainly devoted to a study of the metallic elements, their classification, compounds, and chemical properties. The work is from lectures and assigned text (no laboratory work). *Remsen's Advanced Course. Winter and spring terms, three-fifths study.* Assistant Professor GRINDLEY.

Required: Chemistry 1.

3a. QUALITATIVE ANALYSIS.—This course includes a study of salts, their formation, solubilities, chemical reactions, etc. The periodic classification of the elements is made the basis for developing the principles of analysis. The work in the laboratory, after illustrating those principles, is occupied with the determination of base and acid constituents of a given number of unknown substances. *Winter term, laboratory work 2 hours daily, and lectures 3 hours per week, full study.* Professor PARR.

Required: Chemistry 1.

3b. QUALITATIVE ANALYSIS, continued with more complex Substances.—A comparative study of methods, difficult separations, problems in synthesis, etc. *Spring term, laboratory work 3 hours daily, full study.* Professor PARR.

Required: Chemistry 1, 2.

4. ELEMENTS OF ORGANIC CHEMISTRY.—A course in organic chemistry, provided more especially for students who are not

making a specialty of chemistry. The instruction is directed mainly to the consideration of the general characteristics and the mutual relations of some of the most important classes of carbon compounds, and the course constitutes a general introduction to the principles and the methods of organic chemistry. In the laboratory a few typical substances are prepared. *Remsen's Organic Chemistry. Spring term, full study.* Professor PALMER.

Required: Chemistry 3a.

5a. QUANTITATIVE ANALYSIS.—General principles and practices of gravimetric quantitative analysis, beginning with salts of definite composition. The purpose here is to gain facility and accuracy of manipulation, together with a knowledge of the principles involved in the best practice. Lectures and assigned text from *Fresenius's Quantitative Analysis* accompanying the laboratory work. *Fall term, full study.* Professor PARR.

Required: Chemistry 3b.

5b. QUANTITATIVE ANALYSIS, CONTINUED.—This course includes volumetric analysis and the analysis of silicates; as, feldspars, clays, etc. *Winter term, full study, laboratory work three hours daily.* Professor PALMER and Mr. WHITE.

Required: Chemistry 5a.

5c. EXAMINATION AND ANALYSIS OF FOODSTUFFS, MILK, BUTTER, ETC. SANITARY EXAMINATION OF AIR, OR ANALYSIS OF AGRICULTURAL PRODUCTS, MATERIALS, FERTILIZERS, ETC.—*Spring term, full study. Laboratory work is required three hours daily.* Professor PALMER and Assistant Professor GRINDLEY.

Required: Chemistry 5b.

6. TECHNOLOGICAL CHEMISTRY.—This is lecture-room work only, and comprises a study of technological chemistry as illustrated in those industries having a chemical basis for their principal operations and processes. Much use is made of the journals. *Winter and spring terms, half study. Wagner's Chemical Technology.* Professor PARR.

Required: Chemistry 2, 3b.

7. ADVANCED GENERAL CHEMISTRY.—A course in physical chemistry, including thermo-chemistry, consisting mainly

of laboratory work. It comprises determinations of vapor density, specific heat, depression of freezing point, elevation of boiling point, and calculation of molecular and atomic weights from the data thus obtained, followed by use of calorimeter, polariscope, and other instruments, in determining such constants as serve in characterization or for quantitative estimation of chemical substances, or which serve as the basis of theoretical generalizations. Occasional lectures and the reading of assigned subjects accompany the laboratory work. *Fall, winter, or spring terms, full study.* Professor PALMER.

Required : Chemistry 2, 5b ; Physics 1, 3.

8. IRON AND STEEL ANALYSIS.—Methods for determination of all the constituents are studied, including both rapid and standard methods, especial attention being given to technical methods for determination of phosphorus and sulphur. *Spring term, full study.* Professor PARR and Mr. WHITE.

Required: Chemistry 5b.

9. ORGANIC CHEMISTRY.—The work of this course consists in the detailed discussion of the characteristics of several of the more typical and simple organic compounds, followed by the briefer consideration of most of the important classes of the derivatives of carbon. The instruction comprises lectures, recitations upon assigned subjects, and laboratory work. *Bernthsen's Organic Chemistry* is used as reference and textbook. The laboratory work includes the preparation of organic compounds in accordance with the directions given in the manuals of *Cohen*, *Fischer*, and *Levy*, and the ultimate analysis of several of the finished products. *Winter and spring terms, full study.* Professor PALMER and Assistant Professor GRINDLEY.

Required: Chemistry 2, 5a.

10. SANITARY ANALYSIS.—One whole term is devoted to the chemical examination of potable and mineral waters. Detection and estimation of some of the most important poisons, organic and inorganic. *Fall term, full study.* Professor PALMER.

Required: Chemistry 5a.

11. INVESTIGATIONS AND THESIS.—Candidates for graduation from the chemical courses are required to devote at least

three hours per day for two terms to the investigation of some selected chemical subject, the results of which are to be embodied in a thesis. The choice of subject should be made early in the year. It must be determined upon by consultation with the professors of chemistry before the first Monday in November. Between that time and the beginning of the winter term an index to the bibliography of the subject must be prepared and presented to the professor who is in charge of the investigation. In the research work the student is required to make full use of the various sets of journals, not only for the purpose of preparing himself for the experimental portion of the work and arranging a proper introduction to the thesis, but also as an essential means of extending his acquaintance with chemical literature and drill in consultation of works of reference. *Winter and spring terms, full study.* (A) General, Professor PALMER; (B) Technological, Professor PARR.

Required: Chemistry, 13 credits.

12. THEORETICAL CHEMISTRY.—A course of instruction which includes discussions of the principles and theories of general chemistry. *Ostwald's Outlines of General Chemistry. Winter and spring terms, two-fifths study.* Professor PALMER.

Required: Chemistry 4 and 5a.

13. AGRICULTURAL CHEMISTRY.—A course of lectures upon the chemical principles and processes involved in agriculture, taken conjointly with laboratory practice in analysis of agricultural products and materials. *Winter and spring terms, full study.* Assistant Professor GRINDLEY.

Required: Chemistry 5a.

14. METALLURGY.—Especial attention is given to the effect of impurities in ores upon metallurgical processes and finished products. Fuels, refractory materials, and fluxes are described and their value and application explained. A series of models of furnaces and specimens of furnace material and products are used in illustration. Much use is made of publications and of methods setting forth the present practice of actual plants in operation. *Fall term, full study.* Professor PARR.

Required: Chemistry 8.

15. METALLURGICAL CHEMISTRY AND ASSAYING.—This course includes: (*a*) the analysis of finished metallurgical products; as, commercial lead, spelter, aluminum, copper, etc.; and (*b*) the fire assay of lead, gold, and silver ores. Fluxes, reagents, and charges are studied in connection with various typical ores and practice given in the use of the crucible and muffle furnaces and in the manipulations connected with fire assaying. *Fall term, full study, or either division alone, half study.* Professor PARR and Mr. WHITE.

Required: Chemistry 5b.

16. CHEMISTRY FOR ENGINEERS.—This course is arranged particularly for mechanical engineers. It involves the proximate analysis of coals, determination of calorific power, technical analysis of furnace gases, examination of boiler waters, etc. *Winter term, full study.* Professor PARR and Mr. WHITE.

Required: Chemistry 1.

17. INDUSTRIAL CHEMISTRY.—A laboratory course in the preparation of chemical products from raw materials. The manufacture and proving of pure chemicals, fractionation, and other processes of the manufacturing chemist. *Winter term, full study.* Professor PARR.

Required: Chemistry 5b.

18. SPECIAL ADVANCED COURSES.—Special laboratory courses as indicated below may be arranged for those competent to pursue them. From one-fifth to three credits will be allowed in the undergraduate courses for such work.

(*a*) Technical Gas Analysis, $\frac{1}{5}$ credit.

(*b*) Urinalysis, $\frac{2}{5}$ credit.

(*c*) Toxicology, $\frac{2}{5}$ credit to 2 credits.

(*d*) Metallurgical Chemistry, 1 to 3 credits. Professors PALMER and PARR.

19. SEMINARY.—Reports and discussions upon assigned topics from current chemical literature. One session each fortnight during the junior and senior years. *Two credits.* Professors PALMER and PARR.

20. QUANTITATIVE ANALYSIS.—An elementary course intended especially for such students of other departments as desire some training in the processes of quantitative analysis, but have not the time or the opportunity to enter the regular

course in this subject (Chem. 5). The work may vary in character, to some extent, according to the need of the individual student. *Spring term, full study.* Professor PALMER and Mr. WHITE.

Required: Chemistry 3a.

COURSES FOR GRADUATES

101. Research work in organic chemistry.
102. Research work in general inorganic chemistry.
103. Research work in agricultural chemistry.
104. Investigations of heating power of fuels.
105. Research in metallurgical chemistry.
    (*a*) Action of solvents in extraction of gold and silver from their ores.
    (*b*) Methods of analysis of ores and products.

CIVIL ENGINEERING

1. LAND SURVEYING.—Areas and distances by chain, compass, and plane table; U. S. public land surveys, including legal points involved in the reëstablishment of boundaries; magnetic variation and determination of true meridian. The students solve numerous problems in the field with instruments. To facilitate practice in surveying, an area has been specially prepared in which the difficulties of plane surveying are presented to the beginner as he is able to meet them, and where he is taught practical methods of overcoming them. All possible distances, directions, areas, and elevations are accurately known; and hence the instructor knows before-hand the precise result which the student should obtain. This is an incentive to the student and enables the teacher to show him the degree of accuracy attained, and also to point out errors. *Bellows and Hodgman's Surveyor's Manual. Fall term, full study.* Assistant Professor PENCE.

Required: General Engineering Drawing 1, 2, 3, 4; Math. 4.

2. TOPOGRAPHICAL DRAWING AND SURVEYING.—Topographical drawing is given during the bad weather of the

winter term. The student spends about half a term making the standard topographical symbols. During the spring term topographical surveying is taught, in which students solve problems with the plane table and the stadia, and make a topographical survey and plot the notes. This and course 3 must be taken together. *Winter and spring terms, half study.* Assistant Professor PENCE.

Required: Math. 4; General Engineering Drawing 1, 2, 3, 4; Civil Engineering 1.

3. TRANSIT SURVEYING AND LEVELING.—Construction, adjustment and use of the transit and level; angles, inaccessible distances, and areas with the transit; profiles and contours with the level. Two weeks' time is given to practice in running railroad curves. The department is provided with the instruments necessary for the different branches of engineering field practice, including chains, tapes, compasses, plane tables, stadias, transits, levels, barometers, sextants, and solar transits. These instruments are in constant use by the students whenever the weather will permit. This and course 2 must be taken together. *Baker's Engineers' Surveying Instruments. Winter and spring term, full study.* Assistant Professor PENCE.

Required: Math 4; General Engineering Drawing 1, 2, 3, 4; Civil Engineering 1.

4. RAILROAD ENGINEERING.—In the field practice the class makes preliminary and location surveys of a line of railroad of sufficient length to secure familiarity with the methods of actual practice. Each student makes a complete set of notes, maps, profiles, calculations, and estimates. In addition to the mathematical theory of curves, turnouts, crossings, and the calculations of earth work, instruction is given by means of text-books, assigned reading, and lectures on the principles of economic location, particularly the effect of distance, grade, and curve upon operation and maintenance, and of methods of construction, equipment, and maintenance of way. *Godwin's Railroad Engineer's Field-Book. Fall term, full study; winter term, half study.* Assistant Professor PENCE.

Required: Math. 4; General Engineering Drawing 1, 2, 3, 4; Civil Engineering 1, 2, 3.

5. Masonry Construction.—Requirements and methods of testing stone, brick, cement, and lime; composition, preparation, and strength of mortar and concrete; classification, construction, strength, cost of stone and brick masonry; foundations under water; theory of stability, cost, etc., of dams, retaining walls, bridge piers, bridge abutments, culverts, and arches. The students have experiments in the masonry laboratory, in testing cement, mortar, stone, and brick. *Baker's Masonry Construction. Fall term, full study.* Professor Baker.

Required: Math. 2, 4, 6, 7, 8, 9; Theoretical and Applied Mechanics 1, 2; General Engineering Drawing 1, 2, 3, 4.

6. Geodesy.—Geodesy is taught by lectures and assigned reading. Studies are made of the instruments and methods employed in spirit, barometrical, and trigonometrical leveling; the apparatus and methods used in measuring base lines; the location and construction of stations; the method of measuring the angles and reducing the triangulation; the principles of projecting maps; the methods employed in running parallels and meridians. The apparatus consists of a twelve-inch altazimuth instrument reading to single seconds, a precise level, aneroid and mercurial barometers, three wooden base rods, a comparator, a steel tape with level, thermometer, and spring balance. Problems are solved in barometrical, trigonometrical, and precise leveling, and in reading horizontal angles. *Fall term, half study.* Professor Baker.

Required: Math. 4; General Engineering Drawing 1, 2, 3, 4; Civil Engineering 1, 3; Descriptive Astronomy 2.

7. Practical Astronomy.—Lectures, recitations, and practice. The object is to familiarize the students with those principles of practical astronomy employed in extended surveying operations, and also to train the student in methods of exact observations. The apparatus consists of an observatory with five isolated stone piers; a 12-inch altazimunth instrument reading by micrometers to single seconds, both of altitude and azimuth; an astronomical transit; three chronometers; two sextants; two solar transits; and a set of meteorological instruments. The problems include the adjustments of all the instruments and the determination of time, latitude, and

azimuth by the several methods. *Loomis's Practical Astronomy. Fall term, half study.* Professor BAKER.

Required: Math. 4, General Engineering Drawing 1, 2, 3, 4; Civil Engineering 1, 3; Astronomy 2.

8. BRIDGES.—The instruction in bridges occupies two terms. (1) The first—bridge analysis—is devoted to the calculations of the strains in the various forms of bridge trusses, by algebraic and graphical methods, consideration being given to weights of bridge and train, and force of wind. (2) The second—bridge design—is devoted to designing bridges, proportioning sections, and working out details. Each student designs and makes a full set of drawings of a bridge. The apparatus consists of a series of full-sized joints and connections of a modern iron railroad bridge, numerous models of bridges, a large collection of drawings, photographs, and lithographs of bridges. *Johnson's Modern Framed Structures. Winter and spring terms.* Professor BAKER.

Required: Math. 2, 4, 6, 7, 8, 9; General Engineering Drawing 1, 2, 3, 4; Theoretical and Applied Mechanics 1, 2; Architecture 6.

9. TUNNELING.—This course, treating of methods of tunneling and mine attack, is given to students of civil engineering. The lectures treat first of the nature and use of explosives, compressed air, and power drills. The methods of tunneling are then explained and discussed, with their accompanying methods of timbering and walling. Attention is given to the sinking of shafts for the working of tunnels, or for the purpose of driving. The details of the duties of a tunnel engineer are made as clear and concise as possible. Students are required to make written reports upon the methods employed in particular tunnels. Some time is given in the earlier part of the course to the practice in boring wells, dredging, quarrying, and subaqueous blasting. *Spring term, full study.* Professor BAKER.

Required: Math. 2, 4, 6; General Engineering Drawing 1, 2, 3, 4; Mechanical Engineering 1, 4; Chemistry, 1; Physics 1.

10. SURVEYING.—For students in the courses of architecture, architectural engineering, and mechanical engineering. Areas with chain and compass, U. S. public land surveys, and

principles of reëstablishing corners; use of transit in finding distances, areas, and in laying out buildings; use of the level in finding profiles and contours. *Baker's Engineers' Surveying Instruments. Spring term, full study.* Assistant Professor PENCE.

Required: Math. 4; General Engineering Drawing 1, 3, 4; Physics 1.

11. STRUCTURAL DETAILS.—A study is made of joints and connections in wood and iron. Special attention is given to faulty methods of construction and to impress upon the student the importance of correctly proportioning the smallest details. Each student makes, preferably during the summer vacation preceding his senior year, a full detailed measurement of a pin-connected railway or highway bridge. In the class room he makes a drawing of the structure, computes the stresses, and reports upon the efficiency of each detail. *Lectures, reference books, and drawings. Winter term, full study.* Professor BAKER.

Required: Math. 2, 4, 6, 7, 8, 9; General Engineering Drawing 1, 2, 3, 4; Theoretical and Applied Mechanics 1, 2; Architecture 6; and free-hand sketches with dimensions showing full details of a bridge measured by the student.

COURSES FOR GRADUATES

All primary unless otherwise stated. Each 1 credit.

RAILWAY ENGINEERING

101. Location and Construction.
102. Railway Track and Structures, and their Maintenance.
103. Yards and Terminals.
104. Motive Power and Rolling Stock.
105. Signal Engineering.
106. Railway Operation and Management.

BRIDGE ENGINEERING

107. Bridge Designing.
108. Cantilever and Swing Bridges.
109. Metallic Arches.
110. Metallic Building Construction.

111. Roof Construction.
112. Stereotomy.
113. History of the Development of Bridge Building—Secondary.

WATER-SUPPLY ENGINEERING

114. Tanks, Stand Pipes, and Reservoirs.
115. Sources and Requirements of Water Supply for a City and Removal of Impurities.
116. Water Works Management and Economics.
117. Pumps and Pumping.
118. General Water Works Construction.
119. Biological and Chemical Examination of Potable Water.
120. Description of Water Supply Systems—Secondary.

SEWERAGE

121. Sewage Purification.
122. Sewage Disposal Works.
123. General Sewerage Design and Construction.
124. City Sanitation.
125. Description of Sewerage Systems—Secondary.

ROAD ENGINEERING

126. Economic Aspect of Good Roads and Pavements.
127. Construction of Roads and Pavements.

MISCELLANEOUS SUBJECTS

128. Practical Astronomy.
129. Description of Work Done.
130. Critical Description of Engineering Construction.
131. Translation of Technical Engineering Work from French or German.
132. Any Primary in Theoretical and Applied Mechanics.
133. Any Primary in Mathematics, Mechanical Engineering, or Electrical Engineering—Secondary.

DRAWING, GENERAL ENGINEERING

1. Elements of Draughting.—This term's work is designed as a general preparation for draughting in all

branches. Its aim is, first, to teach the accurate and intelligent use of instruments and materials; and, second, to start the student upon his work with those neat and orderly habits that are invaluable to the competent draughtsman.

The instruction is given by lectures and reference to books in the University library. The problems are arranged so as to be of the most practical benefit to the student, and, instead of being copies of similar problems, are designed to throw him upon his own ingenuity in applying his knowledge of principles learned. This work includes geometrical constructions; orthographic, isometric, and cabinet projections of objects from models or given data; drawings finished in line shading and water-colors, in all about thirty plates. *Lectures and Notes. Fall term, two-fifths study.* Mr. PHILLIPS and Mr. VIAL.

2. DESCRIPTIVE GEOMETRY.—The first term's work in this study includes problems on the point, line, and plane, and some of the simpler geometrical solids. The second term's work takes up plane, single-curved, double-curved, and warped surfaces; the generation and development of the same; sections and intersections, and shades and shadows. The application of principles and methods in numerous and varied practical problems is a large part of the work in each term, comprising in all the drawing of about thirty-nine plates. *MacCord's Descriptive Geometry. Winter term, full study; spring term, half study.* Mr. PHILLIPS and Mr. VIAL.

Required: General Engineering Drawing 1, 4.

3. LETTERING.—Plain and ornamental alphabets; round and stump writing; titles and title pages. *Spring term, half study.* Mr. PHILLIPS and Mr. VIAL.

Required: General Engineering Drawing 1, 4.

4. SKETCHING.—In orthographic, isometric, and cabinet projections. Architectural sketch plans and details; machines, machine parts, and mechanism. Lectures and Notes. *Fall term, three-fifths study.* Mr. PHILLIPS and Mr. VIAL.

5. ADVANCED DESCRIPTIVE GEOMETRY.—Curved lines of the higher orders; higher single curved, warped and double-curved surfaces. *MacCord's Descriptive Geometry*, with references to Warren's General Problems from the Orthographic

Projections of Descriptive Geometry. *Spring term, one-half study.* Mr. PHILLIPS.

Required: General Engineering Drawing 1, 2, 4.

ECONOMICS

1. PRINCIPLES OF ECONOMICS (Elementary Course).—This course is preliminary to all others. It is intended to serve as an introduction to the courses which follow and also to give a general survey of the field of the science for the benefit of those who cannot pursue the subject further. *Fall and winter terms, full study, four times a week.* Professor KINLEY.

2. PRACTICAL ECONOMIC PROBLEMS.—The purpose of this course is to give the student a general knowledge of some of the more important practical economic questions of the times. No text-book is used, but topics are assigned for investigation, and the results presented in debates, followed by general discussion. Written reports will, as a rule, be required from those who lead the debates, in addition to the oral presentation, and a written summary of each debate from each member of the class. *Spring term, full study, three times a week.* Professor KINLEY.

Required: Economics 1. (*Not given in 1896–97.*)

2a. MONEY AND BANKING.—In this course a study of the history and functions of money is followed by a critical study of the monetary and banking history of the United States and of such topics as the theory of prices, credit, government paper, etc. The method pursued is that of Economics 2, supplemented by lectures. *Spring term, full study.* Professor KINLEY.

Required: Economics 1.

3. PUBLIC FINANCE.—The purpose of this course is the historical, comparative, and critical study of the methods and purposes of public expenditure, and of the different sources of revenue, and also the discussion of public debts, their placement, refunding, and redemption. Those who enter the course must take both terms' work. Graduate students will receive credit as such for the course, provided they have had

Economics 1 and 2, or their equivalent, do additional reading assigned in Wagner, Cohn, Beaulieu, and other writers, and also prepare one extended paper, or two shorter ones, on topics connected with the course. *Fall and winter terms, three-fifths study.* Professor KINLEY.

Required: Economics 1.

3a. FINANCIAL HISTORY OF THE UNITED STATES.—This course begins with Hamilton's administration of the treasury. It deals with the growth and management of the national debt, and with the industrial expansion and the tariff history of the country. While the necessary logical separation is observed in the treatment of these subjects, their intimate connection is also emphasized and the economic development of the country as a whole is studied. The course may be taken as a graduate course on conditions similar to those laid down in 3. For graduate students the course will be purely investigative. They must, however, attend the lectures and report from time to time the results of their special investigations and summaries of their additional assigned reading. *Fall and winter terms, three-fifths study.* Professor KINLEY.

Required: Economics 1. (*Not given in 1896–97.*)

4. STATE AND LOCAL TAXATION IN THE UNITED STATES.—This course is a comparative study of taxation in the various states, and also in the cities so far as they present features of special interest. Special attention is given to taxation in Illinois. Those who take this course should take Political Science 8 at the same time; those in the Political Science group who are specializing in Economics *must* take it. *Spring term, three-fifths study.* Professor KINLEY.

Required: Economics 1. (*Not given in 1896–97.*)

4a. TAXATION.—The theory of taxation, modes of taxation, incidence, etc., are carefully discussed. *Spring term, three-fifths study.* Professor KINLEY.

Required: Economics 3 or 3a.

5. RAILROAD PROBLEMS.—This is a short course designed to familiarize the student with the problems of railway management in their economic, social, and legal aspects. Comparison is made of the development of railroad transportation and its regulation in Europe and the United States. Rates,

financial methods of construction, competition, pooling, etc., are discussed, as is also the question of state ownership and management. *Spring term, full study, three times a week.* Professor KINLEY.

Required: Economics 1. The course is open, without the requirement in Economics, to students in the College of Engineering who have taken Civil Engineering 4.

6. SOCIOLOGY.—In this course it is intended to study society in its normal structure. The theories of the nature of society, which have been advanced by various writers, are discussed in the light of the history of social institutions, and an effort is made to formulate some of the laws of social growth. *Fall and winter terms, two-fifths study.* Professor KINLEY.

Required: some course in history or general biology.

7. SOCIAL PATHOLOGY.—This is a course in "applied sociology," consisting of as detailed a study of the problems of pauperism and crime as the time will permit, together with a consideration of theories and methods of reform. *Spring term, two-fifths study.* Professor KINLEY.

8. ECONOMIC SEMINARY.—Advanced students will be formed into a seminary for investigation and for the study of current economic literature. Students who write their theses in economics must do so in connection with the seminary work. The course counts for two credits, but no credit will be given unless the whole course is taken. *Fall, winter, and spring terms, two hours once each week.* Professor KINLEY.

COURSE FOR GRADUATES

101. PRINCIPLES OF ECONOMICS (Advanced Course).—This course is a study of economic theory, beginning with the Physiocrats. Special attention is paid to recent development. It is based on Smith, Mill, Cairnes, Marshall, Roscher, Knies, Wagner, Böhm-Bawerk, Clark, and Patten. It is open to seniors who have taken at least two years' work in Economics. The class will meet at least twice a week at the convenience of the instructor and students.

ELECTRICAL ENGINEERING

1. Dynamo-Electric Machinery.—Lectures and Laboratory. Theory, classification, and tests of dynamo-electric machinery. This course is intended for students in Mechanical Engineering, and for others who need only a superficial acquaintance with dynamos and the necessary testing apparatus. *Spring term, full study.* Assistant Professor Swenson, Mr. Almy.

Required: Physics 1 and 3.

2. ——— [Omitted.]

3. Dynamo-Electric Machinery.—(1) Lectures on theory of dynamo-electric machinery, particularly direct-current machines. (2) Experimental study of dynamo-electric machinery, particularly direct-current machines. (3) Electrical designing and drafting. *Fall term, full study.* Assistant Professor Swenson, Assistant Professor Esty, and Mr. Almy.

Required: Physics 4 and Electrical Engineering 11.

4. Alternating Currents and Alternating-Current Machinery.—(1) Lectures on the theory and application of alternating currents. (2) Experimental study of alternating currents and alternating-current machinery. (3) Electrical designing and draughting. *Winter and spring terms, full study.* Assistant Professor Swenson, Assistant Professor Esty, and Mr. Almy.

Required: Electrical Engineering 3.

5. Photometry.—Lectures and Laboratory. Study of arc and incandescent lamps in connection with their use in electric lighting. *Winter term, half study.* Assistant Professor Swenson, Mr. Almy.

Required: Electrical Engineering 3.

6. Electric Communication.—Lectures and practice. This course includes the theory of the telephone, the telegraph, and electric-signaling devices, and the construction, protection, and operation of lines. *Winter term, full study.* Assistant Professor Esty.

Required: Electrical Engineering 3.

7. Electro-Metallurgy.—Lectures and Laboratory. Theory of electrolysis and practice in treatment of ores and electrolytic separation and refining of metals. *Winter term, half study.* Assistant Professor Esty.

Required: Electrical Engineering 3.

8. LIGHTING PLANTS.—Lectures and draughting. This course includes the construction and use of arc and incandescent lamps; the methods of wiring for arc and incandescent lighting; rules and regulations, the equipment, and management of electric-lighting stations; estimates. *Spring term, full study.* Assistant Professor ESTY.

Required: Electrical Engineering 4, 5.

9. ELECTRICAL TRANSMISSION OF POWER.—Lectures and draughting. This course includes the construction, equipment, and operation of electric railways and stations; the utilization of water power; long distance transmission; applications of electricity in various engineering operations; estimates. *Spring term, full study.* Assistant Professor ESTY and Mr. ALMY.

Required: Electrical Engineering 4 and 5.

10. SEMINARY.—Critical Discussion of current periodical literature of theoretical and applied electricity. *Fall, winter, and spring terms, once a week.* Assistant Professor SWENSON.

11. ELEMENTS OF DYNAMO MACHINERY.—Lectures on the theory of the dynamo. *Spring term, half study.* Assistant Professor SWENSON.

Required: Two terms of Physics 4.

COURSES FOR GRADUATES

PRIMARY

101. Mathematical Theory of Electricity and Magnetism, 1, 2, or 3 credits.

102. Absolute Measurements in Electricity and Magnetism, 1, 2, or 3 credits.

103. Dynamo Electric Machinery, 1, 2, or 3 credits.

104. Electrical Transmission of Power, 1, 2, or 3 credits.

105. Electro-Metallurgy, 1, 2, or 3 credits.

106. Photometry, 1, 2, or 3 credits.

107. Calorimetry, 1, 2, or 3 credits.

108. Economy of Production and Utilization of Electrical Energy, 1 credit.

109. Consulting Engineering, 1 credit.

SECONDARY

110. Mathematics, 1, 2, or 3 credits.

111. Physics, 1, 2, or 3 credits.

112. Language, 1, 2, or 3 credits.

113. Chemistry, 1, 2, or 3 credits.

114. Architectural Engineering, 1, 2, or 3 credits.

115. Civil Engineering, 1, 2, or 3 credits.

116. Municipal and Sanitary Engineering, 1, 2, or 3 credits.

117. Mechanical Engineering, 1, 2, or 3 credits.

118. Translation of Technical Engineering Works, 1, 2, or 3 credits.

ENGLISH LANGUAGE AND LITERATURE

1. GENERAL SURVEY OF ENGLISH LITERATURE.—Prescribed for sophomore year in College of Literature and Arts. *Fall, winter, and spring terms, two-fifths study.* Assistant Professor KATHARINE MERRILL.

2. PROSE WRITERS OF THE EIGHTEENTH AND NINETEENTH CENTURIES.—*Fall, winter, and spring terms, three-fifths study.* Assistant Professor KATHARINE MERRILL.

3. POETRY OF THE NINETEENTH CENTURY.—*Fall, winter, and spring terms, three-fifths study.* Assistant Professor KATHARINE MERRILL.

4. PROSE WRITERS OF THE SIXTEENTH AND SEVENTEENTH CENTURIES.—*Fall, winter, and spring terms, two-fifths study.* Professor DODGE.

5. SHAKSPERE AND HISTORY OF THE DRAMA.—Primarily for graduates. *Fall, winter, and spring terms, three-fifths study.* Professor DODGE.

Required: English 1, 2, 3, and 4.

6. HISTORY OF ENGLISH CRITICISM.—Primarily for graduates. *Fall, winter, and spring terms, two-fifths study.* Professor DODGE.

Required: English 1, 2, 3, and 4.

7. SEMINARY: COMPARATIVE MODERN FICTION.—Open only to senior and graduate students. *Fall, winter, and spring terms, one-fifth study.* Assistant Professor KATHARINE MERRILL.

8. OLD ENGLISH (ANGLO-SAXON) GRAMMAR AND PROSE.—*Fall, winter, and spring terms, three-fifths study.* Professor DODGE.

9. EARLY ENGLISH.—*Fall, winter, and spring terms, two-fifths study.* Professor DODGE.

10. OLD ENGLISH POETRY.—*Fall, winter, and spring terms, three-fifths study.* Professor DODGE.

Required: English 8.

11. FOURTEENTH AND FIFTEENTH CENTURY LITERATURE.—*Fall, winter, and spring terms, two-fifths study.* Professor DODGE.

Required: English 8 and 9.

12. HISTORY OF THE ENGLISH LANGUAGE.—One hour a week. *Fall, winter, and spring terms, two-fifths study.* Professor DODGE.

Required: English 8 and 9.

13. ICELANDIC.—*Fall, winter, and spring terms, full study* Professor DODGE.

Required: English 8 and 9, or German 1.

14. OLD ENGLISH LEGAL CODES.—Special course for students of politics, economics, and history. As an introduction to the course Old English Grammar is studied so far as is necessary for a proper understanding of early phraseology. Primarily for graduates, but open to undergraduates having sufficient preparation. *Fall, winter, and spring terms, two-fifths study.* Professor DODGE.

Required: One year of history, economics, or sociology, or of English literature.

15. SEMINARY METHODS OF ENGLISH TEACHING.—Open to senior and graduate students. *Fall, winter, and spring terms, one-fifth study.* Professor DODGE and Assistant Professor MERRILL.

COURSE FOR GRADUATES

101. DANISH.—Full study through the year.

FRENCH

1. Elementary Course.—The course embraces grammatical study, pronunciation, exercises in composition, and conversation. Reading of representative works of modern authors, such as Halévy, Labiche, Daudet, Jules Verne, and others. *Fall, winter, and spring terms, full study.* Assistant Professors Fairfield and Piatt.

2. Nineteenth Century.—(1) The class will read works of Mérimée, George Sand, Balzac, Sandeau, Bourget, Hugo, and others. (2) Outlines of French literature. (3) Assigned readings and reports thereon. *Fall, winter, and spring terms, full study.* Assistant Professor Fairfield.

Required: French 1 or 5.

3. Seventeenth Century.—(1) Readings from Molière, Corneille, Racine, Lafontaine, Boileau, de Sévigne, and others. (2) Study of French literature and civilization of the century. (3) Advanced composition. (4) Assigned readings. *Fall, winter, and spring terms, full study.* Assistant Professor Fairfield.

Required: French 2.

4. Eighteenth Century.—(1) The course will consist of lectures in French, themes, and collateral reading. Reading of selected works of Voltaire, Montesquieu, Rousseau, Chénier, and Beaumarchais. (2) Assigned readings. (3) Themes in French upon subjects connected with the course. *Fall, winter, and spring terms, full study.* Assistant Professor Fairfield.

Required: French 3.

5. Scientific and Technical French.—Similar to Course 1 for first two terms. In the spring term, this class will be divided into sections for the study of scientific and technical French, suited to the demands of the several colleges, each student working in his own special line. Particular attention will be given to acquiring a technical vocabulary and to rapid reading. *Fall, winter, and spring terms, full study.* Assistant Professor Piatt.

COURSES FOR GRADUATES

101. Old French Readings.—Clédat, Les Auteurs Français du Moyen Age; Suchier, Aucassin et Nicolete; Gautier,

La Chanson de Roland. Translation and comparison with the modern idiom. Study of the laws of phonetic changes. Lectures upon Old French philology.

102. A Systematic Study of Special Topics.—French poets of the sixteenth century. Malherbe; his school and his influence. Sacred eloquence of the seventeenth century.

GEOLOGY

1. Geology, Major Course.—(*a*) Dynamic Geology. The instruction given under this head is intended to familiarize the student with the forces now at work upon and within the earth's crust, modeling its reliefs, producing changes in the structure and composition of its rock masses and making deposits of minerals and ores. A series of localities is studied in which great surface changes have recently taken place, with a view to ascertaining the character of the forces producing such changes, and the physical evidence of the action of like forces in the past. The subject is taught by lectures, and is abundantly illustrated by maps, models, charts, and views.

(*b*) Petrographic Geology. The instruction under this topic is given by lectures and laboratory work. The subjects included are the classification of rocks, the methods used in their determination, the conditions governing the formation of each species, the decompositions to which they are liable, and the products of these decompositions. Each student is supplied with a set of blowpipe tools and reagents and a series of hand specimens covering all the common species of rocks.

(*c*) Historical Geology. The work on this subject is substantially an introduction to the history of geology as a science, and the developmental history of the leading geological doctrines. So far as may be done with the data in hand; an attempt is also made to trace the history of each geological period.

(*d*) Paleontology. The scheme of instruction in this subject places before the student the classification adopted for those organic forms occurring as fossils, together with the succession of the various groups that occur in the strata, with the cause, as far as known, for their appearance and disappearance. The student is required to familiarize himself with selected groups of paleozoic fossils, abundant illustrations of

which are placed in his hands. The subject is presented in lectures and demonstrations, each group being considered in connection with its nearest living representative.

(*e*) Economic Geology. The final term of this course is devoted to a study of the uses man may make of geologic materials, the conditions under which these materials occur, and the qualities which render them valuable. The instruction is given by lectures, with reference to the various state and government reports, transactions of societies, and monographs in which these subjects are treated, as well as by demonstrations with materials from the collections of the University.

In dynamic and historical geology Dana's manual is used as a reference book, and in economic geology Tarr's Economic Geology of the United States. Petrography is pursued by means of a blue-print adaptation of Rosenbusch for the crystalline rocks, and various authors for the fragmental. In paleontology Nicholson and Zittel are used for descriptions of the larger groups, Miller for general distribution, and the various state surveys for species. *Winter, spring, and fall terms, full study.* Professor ROLFE and Mr. MOSIER.

Required: Chemistry 3b; Mineralogy 1.

2. INVESTIGATIONS AND THESIS.—For students who select a geological thesis guidance and facilities will be afforded for individual investigations in the field and laboratory. *Fall, winter, and spring terms, full study.* Professor ROLFE.

Required: Geology 1.

3. ENGINEERING GEOLOGY (for engineers only).—It is the object of this course to bring together those parts of geology which will be of the greatest practical benefit to an engineer. The course will deal mainly with subjects connected with the origin, classification and transformation of rocks, with the principles which govern the deposition and structure of rock masses; with the conditions under which the useful rocks and minerals occur, and the conditions which make them more or less valuable. The instruction is given by lectures and by demonstrations in the laboratory. *Spring term, full study.* Professor ROLFE and Mr. MOSIER.

4. GENERAL GEOLOGY, MINOR COURSE.—This course includes a selection of such geological facts and theories as should be known to every intelligent person. with such

discussion of them as the time will permit. The subjects treated will be fully illustrated, and opportunity will be afforded for some study of rocks and fossils. *Winter term, full study.* Professor ROLFE.

COURSES FOR GRADUATES

101. PALEONTOLOGY.—A critical and comparative study of the fossils found in the rocks of Illinois.

102. ECONOMIC GEOLOGY.—The effects which variations in the chemical composition and physical constitution of inorganic substances used in the arts have on the qualities of the manufactured product, and should have on methods of manufacture. A critical examination of the tests now employed in determining the qualities of building stones.

103. ILLINOIS GEOLOGY.—Glacial geology in relation to water supply of drift-covered regions. Dynamic and stratigraphic geology of the Ozark uplift in Illinois.

GERMAN

1. ELEMENTARY COURSE.—For students in the College of Literature and Arts. Joynes-Meissner's Complete German Grammar, Storm's Immensee, Gerstaecker's Germelshausen, Stoekl's Unter dem Christbaum, Jensen's Branne Erica, etc. *Fall, winter, and spring terms, full study.* Professor SNYDER and Mr. R. P. SMITH.

2. COMPOSITON AND CLASSIC READING.—For students in the College of Literature and Arts. Goethe's Iphigenie; Hermann und Dorothea, or Torquato Tasso; Schiller's Wilhelm Tell; Maria Stuart, or Jungfrau von Orleans. Modern Prose: Stifter's Das Haidedorf; Fouqué's Undine; Scheffel's Ekkehard; Freytag's Aus dem Staat Friedrich's des Grossen; Schiller's Gustav Adolph in Deutschland, etc. *Fall, winter, and spring terms, full study.* Professor SNYDER.

Required: German 1.

3. CRITICAL STUDY OF MODERN GERMAN LITERATURE.—For students in College of Literature and Arts.

Bernhardt's Goethe's Meisterwerke, Lessing's Nathan der Weise, Minna von Barnhelm; Schiller's Wallenstein,

Buchheim's Deutsche Lyrik, etc. Lectures, Composition, and Conversation. Assigned readings from modern authors and reports thereon. *Fall, winter, and spring terms, full study.* Professor SNYDER.

Required: German 1 and 2.

4. ANCIENT LANGUAGE.—Middle High German, Old High German, and Gothic Grammar and Reader (Wright's). Lectures on the history of the language and its early literature. The study is conducted in German. For students in the College of Literature and Arts. *Fall, winter, and spring terms, three times a week, full study.* Professor SNYDER.

Required: German 1, 2, and 3.

5. SCIENTIFIC AND TECHNICAL READING.—For students in the Colleges of Science and Engineering. Joynes-Meissner's Shorter German Grammar, Storm's Immensee, Gerstaecker's Germelshausen, Stoekl's Unter dem Christbaum. *Fall and winter terms, full study.* In the spring term the classes will be divided into sections for the study of scientific and technical German, each student reading in his own special line. Particular attention given to the acquisition of a technical vocabulary and rapid reading. *Spring term, full study.* Mr. R. P. SMITH.

6. ADVANCED SCIENTIFIC AND TECHNICAL READING.—Special Reading, more advanced than in third term of course 5, and on same plan. *Winter and spring terms, full study.* Mr. R. P. SMITH.

Required: German 1 or 5.

GREEK

1. SELECTIONS FROM HERODOTUS, with readings from Thucydides for comparison of style and historic method. Studies in Ionic etymology. Greek Prose once a week, with particular reference to the syntax of the verb. *Fall term, full study.* Professor MOSS.

2. ANDOCIDES DE MYSTERIIS, Lysias for Mantitheus, Demosthenes on the Crown. The development of oratory among the Greeks, by lectures and library references. *Winter term, full study.* Professor MOSS.

Required: Greek 1.

3. Demosthenes on the Crown, Aeschines against Ctesiphon. Continuation of winter term's work. *Spring term, full study.* Professor Moss.

Required: Greek 1, 2.

4. Xenophon's Memorabilia.—Lectures upon the work and influence of Socrates as a public teacher, with collateral readings upon assigned topics. *Fall term, full study.* Professor Moss.

Required: Greek 1, 2, 3.

5. Plato.—One entire dialogue and selections from others. Studies in the rhetoric and idiom of the author. Discussion of his philosophical views, so far as illustrated in the pieces read. *Winter term, full study.* Professor Moss.

Required: Greek 1, 2, 3, 4.

6. Æschylus's Eumenides, Euripides's Hecuba. History of the Greek drama. The literary structure and technics of the plays named. *Spring term, full study.* Professor Moss.

Required: Greek 1, 2, 3, 4, 5.

7. Homer.—Two or three books of the Iliad will be read by the class in common, and made the basis for some preliminary studies, when special readings in the text will be assigned to each student, and papers prepared by them upon suitable topics. Such papers will be read before the class and discussed. *Fall term, full study.* Professor Moss.

Required: Greek 1, 2, 3, 4, 5, 6.

8. Homer.—Continuation of course 7. *Winter term, full study.* Professor Moss.

Required: Greek 1, 2, 3, 4, 5, 6, 7.

9. Old Greek Life.—Course of semi-weekly lectures upon old Greek life, political, social, etc. For those who take the lectures and minimum reading, half study; for others, full study. *Spring term.* Professor Moss.

COURSES FOR GRADUATES

101. Greek Lyric Poetry.

102. Plato.

HISTORY

1. Mediæval and Modern European History.—Elementary, introductory course. *Fall, winter, and spring terms,*

three-fifths study. Associate Professor Greene and Assistant Professor Hammond.

2. Historical Introduction to Contemporary Politics.—Constitutional and political tendencies of the nineteenth century, as represented by the political parties of England, the United States, France, and Germany. *Fall, winter, and spring terms, two-fifths study.* Associate Professor Greene and Assistant Professor Hammond.

3. American History.—The origin and growth of the nation from the beginning of English Colonization in America to the close of the Reconstruction period. *Fall, winter, and spring terms, full study. Students may, however, enter the course at the beginning of the winter term, omitting the colonial era.* Associate Professor Greene.

Required: History 1 or 2.

4. English Constitutional History.—*Fall, winter, and spring terms, three-fifths study.* Assistant Professor Hammond.

Required: History 1.

5. Europe in the Sixteenth Century.—The Protestant Reformation and the Counter-reformation. *Fall term, three-fifths study.* [*Omitted after 1895–96.*]

6. England under the Stuarts.—The Puritan Revolution. *Winter term, three-fifths study.* [*Omitted after 1895–96.*]

7. Modern European History.—Europe from the age of Louis XIV. to the present time. *Fall, winter, and spring terms, three-fifths study.* [*Not given in 1895–96.* Courses 7 and 12 will be given in alternate years.] Associate Professor Greene.

Required: History 1.

8. Seminary in American History.—Training in the use of the sources. *Fall, winter, and spring terms, two-fifths study.* Associate Professor Greene. Course 8 is open to graduates and also to seniors of high standing who take or have taken History 3.

9. Seminary in Mediæval History.—Topics to be arranged. Students who take this course will be expected to take History 10 also. *Fall, winter, and spring terms, two-fifths study.* Assistant Professor Hammond.

10. European History from 800 to 1300.—A study of

the period most fitly termed "mediæval," and of its characteristic institutions. *Fall and winter terms, three-fifths study.* Assistant Professor HAMMOND.

Required: History 1.

11. EUROPE IN THE FOURTEENTH AND FIFTEENTH CENTURIES.—The transition from the middle ages to the modern world. *Spring term, three-fifths study.* Assistant Professor HAMMOND.

Required: History 1.

12. THE BEGINNING OF MODERN EUROPE.—The Protestant Reformation and the religious wars. The Puritan Revolution in England. The rise of the Bourbon monarchy in France. *Fall, winter, and spring terms, three-fifths study.* Associate Professor GREENE.

Required: History 1.

COURSES FOR GRADUATES.

101. Seminary in American History.
102. Seminary in Mediæval History.

HORTICULTURE

1. INTRODUCTORY COURSE.—This course is intended to give a general idea of horticultural work such as all students of agriculture should have, and, at the same time, to prepare those who wish it for more advanced work along the same lines.

Studies are made in the planting and care of nurseries, orchards, vineyards, small fruits, gardens, and ornamental grounds. Students are given practice in propagating by grafts, buds, cuttings, seeds, etc.; in the pruning, training, or other management of different fruits, in transplanting and in the preparation and use of remedies against insects and diseases. *Barry's Fruit Garden, lectures, reference reading, and laboratory work. Fall term, two-fifths study, and spring term, three-fifths study.* Mr. MCCLUER.

2. FRUIT CULTURE.—Orchards, vineyards, small fruit plantations and their products constitute the main subjects of this term's work. Lectures are given upon propagating, planting, and cultivating trees and vines; upon identifying, classifying, and preserving fruits, and upon diseases and remedies. Studies are made upon illustrative material in the laboratory, and visits

to the orchards and plantations form a part of the instruction. *Fall term, full study.* Mr. McCluer.

3. Forestry.—This course embraces a study of forest trees and their uses, their natural distribution, and their artificial production. The relations of forest and climate are studied, and the general topics of forestry legislation and economy are discussed. *Lectures. Winter term, two-fifths study.* Professor Burrill.

4. Plant Houses and House Plants.—This study includes gardening and landscape architecture; the methods of construction, heating, and ventilation, and general management of greenhouses, and the study of the kinds, propagation, growth and care of flowering plants. Each student has practice in propagating by cuttings and otherwise, in potting and shifting, and in care of plants requiring various treatment. Insects and diseases, with remedies, are treated, and the means of securing vigor of growth and abundance of flowers are studied and illustrated by practice. *Henderson's Practical Floriculture. Winter term, three-fifths study.* Mr. McCluer.

5. Gardens.—Kitchen and market gardens are made the first subjects of study, after which ornamental and landscape gardening occupies the time. *Henderson's Gardening for Profit; Long's Ornamental Gardening. Spring term, full study.* Mr. McCluer.

6. Plant Propagation.—The modification of plants under cultivation, and the methods of securing and perpetuating desirable variations; self- and cross-fertilization; fertilization with much or little pollen; hybridization; seeds of different degrees of maturity, size, etc.; bud variation and graft hybrids; bud and graft unions; influence of stock on cion, and cion upon stock; whole and piece roots. In this course some account is given of what has been done and an attempt is made to reach conclusions as to what may be done in the line of the subject. Lectures, reference readings, and laboratory work. *Fall term, full study.* Professor Burrill and Mr. McCluer.

Required: Botany 1.

ITALIAN

1. Grammar and Reading.—Grandgent's Italian Grammar, reading of modern authors; Dante's Divina Commedia,

outlines of Italian literature. *Fall, winter, and spring terms, full study.* Assistant Professor FAIRFIELD.

LATIN

1. LIVY.—Selections from the XXI. and XXII. books. Eutropius. Latin composition based on the text. The main object of this course is to secure accuracy in pronunciation and facility in reading easy Latin. *Fall term, full study.* Professor BARTON.

2. PLINY.—Selected letters. Latin composition based on the text. The life of a Roman gentleman under the early empire. *Winter term, full study.* Professor BARTON.

Required: Latin I.

3. TERENCE.—Phormio and Heautontimorumenos. Roman comedy, lectures. Hayley's introduction to the verse of Terence. Scenic antiquities. *Spring term, full study.* Professor BARTON.

Required: Latin 1, 2.

4. HORACE.—Odes. Roman lyric poetry. Lectures and assigned readings. *Fall term, full study.* Professor BARTON.

Required: Latin 1, 2, 3. This course will be given in alternate years with course 5. [*Not given in 1896–'97.*]

5. HORACE.—Satires and Epistles. Especial reference to the private life of the Romans in the time of Augustus. *Fall term, full study.* Professor BARTON.

Required: Latin 1, 2, 3.

6. TACITUS.—Agricola and Germania. Agricola will be considered both from the standpoint of biography, and also as an introduction to the constructions and style of Tacitus. Germania, in connection with Cæsar's account of the customs of the Germans. *Winter term, full study.* Professor BARTON.

Required: Latin 1, 2, 3.

7. PLAUTUS.—Captivi and Pseudolus. Assigned readings and themes on the leading characters of the plays and on the social conditions indicated. *Spring term, full study.* Professor BARTON.

Required: Latin 1, 2, 3.

8. THE ROMAN HISTORIANS.—Readings from Cæsar, Sallust, Livy, and Tacitus. The aim of the course is partly grammatical,

and partly devoted to study of differences in style and method of treating historical themes. *Fall term, full study.* Professor BARTON.

Required: Latin 1, 2, 3.

9. JUVENAL AND MARTIAL.—Selected Readings. Roman Satire. Society in the first century. Lectures and themes. *Winter term, full study.* Professor BARTON.

Required: Latin 1, 2, 3.

10. TEACHERS' COURSE.—Study and discussion of the aims and essentials of preparatory Latin, methods of presentation, and difficulties to be met. Students will do the work of a preparatory class and at intervals will take charge of the recitation. *Spring term, full study.* Professor BARTON.

COURSES FOR GRADUATES

101. CATULLUS.—Selected readings. The position of Catullus and Horace in lyrical poetry; the indebtedness to Catullus of Horace, Virgil, and the elegiac poets.

102. THE ELEGIAC POETS.—Selections from Ovid, Propertius, and Tibullus.

103. ROMAN LITERARY PROSE STYLE.—Selected readings to trace in a connected manner the characteristics of prose style under the Republic, during the time of Augustus, and under the early empire.

MATHEMATICS

1. ADVANCED ALGEBRA.—For students in the Colleges of Agriculture, Science, Literature, and Arts. Functions and their notations; series and the theory of limits; imaginary quantities; general theory of equations. Topical reviews of all preceding algebraic processes. *Wells's College Algebra. Fall term, full study.* Mr. GUNN and Mr. KETCHUM.

2. ADVANCED ALGEBRA.—For students in the college of Engineering. Principles of small practical value are subordinated to those of higher utility. Accuracy and dispatch in the use of principles are continually emphasized. A topical review of the principles of elementary algebra is made from time to time. This review is sometimes made by requiring students to solve practical problems illustrative of principles

not well understood. Some of the most important subjects in which instruction is given are functions and their notation; the progressions; theory of numbers; permutations and combinations; probabilities; convergency and divergency of series; summation of series; undetermined coefficients; doctrine of limits; logarithms and general theory of equations. *Wells's College Algebra. Fall term, full study.* Mr. BURNHAM.

3. TRIGONOMETRY.—For students in the Colleges of Literature and Arts, Science, and Agriculture. Trigonometry, plane and spherical; fundamental relations between the trigonometrical functions of an angle or arc; relations between the functions of different angles or arcs; construction and use of tables; solution of triangles; angles as functions of sides, and sides as functions of angles; applications. *Jones's Trigonometry. Winter term, full study.* Mr. GUNN and Mr. KETCHUM.

Required: Math. 1.

4. TRIGONOMETRY.—For students in College of Engineering. The ratio system is studied chiefly, but the necessary connection between it and the line system is carefully proved and illustrated. Students are frequently required to demonstrate the same proposition, using first the line values, then the ratio values of the functions. The subjects taught are the circular measurement of angles, general formulas of plane and spherical trigonometry, relations between functions of multiples of 90° plus or minus an angle, solution of right and oblique plane triangles, of spherical, right, and oblique triangles, Napier's rules and analogies, and practical applications of principles to the solution of astronomical problems. Teaching is in part by text-book, and in part by assigning principles to be demonstrated and problems to be solved outside of the text-book. *Jones's Trigonometry. Winter term, full study.* Mr. BURNHAM.

Required: Math. 2.

5. CONIC SECTIONS (Geometrical Method).—Definitions and general properties of the ellipse, hyperbola, and parabola, curvature of the conic sections; elements of analytical geometry. Properties and relations of the point and right line in a plane, and of the conic sections. *Cockshott & Walters's Geometrical Conics. Spring term, full study.* Mr. GUNN.

Required: Math. 1, 3.

6. ANALYTICAL GEOMETRY.—The aim is to acquaint the student with analytical methods of investigation and to familiarize him with some of the most recent developments in synthetic geometry; to make him more skilful in the use of algebraic processes, especially as a means of demonstrating geometric properties of loci. Subjects considered are the elementary theory of the point and right line in a plane; use of abbreviated notation; elementary theory of the conic sections, their equations and properties developed analytically; poles and polars; synthetic geometry of the circle, and the discussion of the general equation of the second degree. *Wood's Coördinate Geometry. Spring term, full study.* Mr. BURNHAM.

Required: Math. 2, 4.

7. DIFFERENTIAL CALCULUS.—Variables and functions; limits and infinitesimals; differentials and derivatives; differentiation of explicit functions, implicit functions, and functions of several variables; derivatives of higher orders; successive derivatives, developments in series; maxima and minima of functions; indeterminate forms; plane curves, tangents, and normals; asymptotes, singular points, and curve tracing; theory of envelopes, of curvature, of evolutes, and involutes. *Byerly's Differential Calculus. Fall term, full study.* Professor SHATTUCK.

Required: Math. 2, 4, 6.

8. ADVANCED ANALYTICAL GEOMETRY.—Position and direction in space; direction and angles; projections of lines, direction cosines; transformation of coördinates; the general and normal equations of the plane; also in terms of the intercepts; the plane satisfying given conditions; relations of planes to one another; perpendicular distance to a plane; bisectors of dihedral angles; symmetrical equations of a straight line; condition that a line shall be parallel to a plane; equation of the common perpendicular to two given lines; condition of intersection; a quadric surface; conjugate axes and planes; classes of quadrics; tangent and polar lines, and planes to a quadric; surfaces derived from generating curves; the equations of the helix; the conoid. *Wood's Coördinate Geometry. Winter term, full study.* Professor SHATTUCK.

Required: Math. 2, 4, 6, 7.

9. INTEGRAL CALCULUS.—Elementary forms of integration; integrals immediately reducible to the elementary forms;

integration by rational transformations; integration of irrational algebraic differentials; integration of transcendent functions; definite integrals; successive integration; differentiation under the sign of integration; integration by means of differentiating known integrals; double integrals; triple and multiple integrals; product of two definite integrals.

Rectification and quadrature; the parabola, the ellipse, the cycloid, the Archimedean spiral, the logarithmic spiral, the limniscate, the cycloid, quadrature of surfaces of revolution and of surfaces in general; cubature of volumes; the sphere, the pyramid, the ellipsoid, any solid of revolution, and of volumes in general. *Byerly's Integral Calculus*. *Spring term, full study*. Professor SHATTUCK.

Required: Math. 2, 4, 6, 7, 8.

10. THEORY OF EQUATIONS.—The development of the general properties of equations; relations of the roots and the coefficients of an equation, with applications to symmetric functions; transformation of equations; solution of reciprocal and binomial equations; algebraic solution of cubics and biquadratics; properties of derived functions; the limits and separation of the roots of equations; the solution of numerical equations of the nth degree. *Burnside and Panton's Theory of Equations*. *Fall term, full study*. Associate Professor TOWNSEND.

Required: Math. 2, 4.

11. THEORY OF DETERMINANTS.—The origin and notation of determinants, properties of determinants, determinant minors, multiplication of determinants, determinants of compound systems, determinants of special forms—Jacobians, Hessians, Wronskians—with applications to algebra, including linear transformations, and to analytic geometry. *Weld's Theory of Determinants* with selected chapters from *Scott's Theory of Determinants*. *Winter term, full study*. Associate Professor TOWNSEND.

Required: Mathematics 2, 4, 6, 7.

12. THEORY OF INVARIANTS.—The course will cover the general development of the theory of invariants, both from the geometric and from the algebraic side. Applications of invariants will be made to systems of conics and to Higher Plane Curves. *Bruno's Binären Formen* will be followed in part, but frequent use will be made of *Clebsch's Geo-*

metrie. Spring term, full study. Associate Professor TOWNSEND.

Required: Math. 7, 10, 11.

13. THEORY OF FUNCTIONS.—By way of introduction, considerable attention will be given to the geometric representation of the complex variable, including Argand's diagram, conformal representation, and harmonic ratios, and bilinear transformation. This will be followed by the development of the theory of infinite series, algebraic and transcendental functions, integration of uniform functions, Riemann's surfaces, etc. *Durége's Theory of Functions and Collateral Reading. Fall term, full study.* Associate Professor TOWNSEND.

Required: Math. 8, 9, 12.

14. METHOD OF LEAST SQUARES.—The object of this course is to present the fundamental principles of the subject, in a manner so plain as to render them intelligible and useful to students of astronomy and engineering. The following subjects will be studied: Law of probability and error, adjustment of observations, precision of observations, independent and conditioned observations, etc. *Merriman's Least Squares. Fall term, three hours per week. This, with Astronomy 3, two hours per week, makes a full study.* Associate Professor MYERS.

Required: Mathematics 7, 8, 9.

15. SEMINARY AND THESIS.—*Fall, winter, and spring terms, two-fifths study.*

16. DIFFERENTIAL EQUATIONS.—This subject is designed for students in the courses of engineering and mathematics and astronomy. It will embrace the following topics: General linear equations with constant coefficients, special forms of differential equations of higher order, integration of series, etc. *A. R. Forsyth's Differential Equations. Winter and spring terms, three hours per week. This, with Astronomy 3 of winter and spring terms, constitutes a full study.* Associate Professor MYERS.

Required: Math. 7, 8, 9.

17. ANALYTIC GEOMETRY OF SPACE.—A general review will be given of the position of the plane and the right line in space and the more general properties of surfaces of the second degree. To this will be added the classification of quadrics, special properties of quadrics, foci, and confocal surfaces,

general theory of surfaces, curves and developables, families of surfaces, and surfaces of higher orders. *Charles Smith's Solid Geometry, with references to Salmon's Geometry of three Dimensions. Winter term, full study.* Associate Professor TOWNSEND.

Required: Math. 7, 8, 11.

18. HIGHER PLANE CURVES.—The course is designed to cover the general properties of Algebraic curves, including the theory of multiple points and tangents, curve tracing, poles and polars, and reciprocal curves; to which will be added envelopes, cubics and quadrics, transcendental curves, transformation of curves, and the general theory of curves. *Lectures with Collateral Reading. Spring term, full study.* Associate Professor TOWNSEND.

Required: Math. 8, 9, 12.

19. SOLID AND SPHERICAL GEOMETRY.—This is the course prescribed for the students in the College of Literature and Arts. *Spring term, full study.* Mr. KETCHUM.

MECHANICAL ENGINEERING

1. SHOP PRACTICE.—In the shops the students are advanced in the work as fast as their ability will permit. The work, as far as possible, is carried along the same lines as those practised in our leading commercial shops. The exercises are, in general, chosen from parts of machines under construction, being carefully graded according to the skill of the student. The policy of the department is to give the student every possible advantage and to teach him to produce accurate work in the shortest possible time. Beginning with the care and use of the tools with which he is to work, the student is carried through the various operations of machine-shop practice. The following outlines the work in the several shops as laid down for the regular classes, the work of the several terms being subject to transposition.

First Term, Wood Shop.—Primary exercises relating to the use and care of tools, and the construction of a series of exercises in joint work and turning, preparatory to pattern making.

Second Term, Wood Shop.—The work of this term is devoted largely to the making of patterns and core boxes,

particular attention being given to the principles of molding.

Third Term, Foundry.—The student here receives instruction in the management of the cupola and molding, including green and dry sand core making. *Fall, winter, and spring terms, full study.* Mr. CURTISS and Mr. WILSON.

2. SHOP PRACTICE.—First Term, Forge Shop.—Instruction is given in the forging and welding of iron and steel, special attention being given to the forging and tempering of lathe and planer tools, annealing, and case hardening.

Second Term, Machine Shop.—During this term the student receives instruction in chipping, filing, and elementary lathe and planer work.

Third Term, Machine Shop.—Lathe, planer, drill, shaper, or bench work. *Fall, winter, and spring terms, half study.* Mr. CLARK and Mr. JONES.

3. SHOP PRACTICE AND LABORATORY.—First Term, Machine Shop.—Lathe, planer, milling machine, grinding machine, or bench work.

Second Term, Machine Shop.—Advanced work on any of the machines in the shop, or erecting and fitting. *Fall and winter terms, half study.* Assistant Professor VANDERVOORT, Mr. CLARK, Mr. CURTISS, and Mr. JONES.

Third Term.—Mechanical Engineering Laboratory.—This is the beginning of the work in the mechanical engineering laboratory. The course is designed to meet the needs of the student in electrical engineering and to acquaint him with the various instruments and methods used in engine and boiler testing. Considerable work is done with the indicator, and a study of diagrams obtained under different conditions is undertaken. *Spring term, half study.* Professor BRECKENRIDGE and MR. WOOD.

Required: Mechanical Engineering 1, 2, 5, 6.

4. ELEMENTS OF MACHINE DESIGN.—The basis of this work is found in *Klein's Elements of Machine Design.* A series of plates 26x40 inches is constructed, covering a wide range of machine parts. There are 334 formulas, empirical and rational, the use and derivation of which are explained. By means of a large number of practical examples, sufficient drill is obtained in using them to enable the student to make the calculations required when designing such parts of machines as screw threads, nuts and bolts, rivets and riveted

joints, keys, connecting-rod ends, belts, pulleys, stepped cones, shafts, end and neck journals, pivots, and bearings for rotating pieces. Problems relating to gearing are taken up, such as exact and approximate methods of laying out profiles of teeth, proportions of teeth for strength and durability; circular and diametral pitch; cast and cut gears; sizing of blanks; gear cutters; wooden teeth; spur, bevel, and worm gearing, and proportions of worm gearing for highest efficiency. *Fall, winter, and spring terms, half study.* Mr. GOODENOUGH.

Required : General Engineering Drawing 1, 2, 3, 4.

5. MECHANISM.—A study of the nature and equivalence of mechanisms. Determination of centrodes. Graphical diagrams of the paths, speeds, and accelerations of important points of familiar mechanisms. Laying out of cams. Analysis of difficult mechanisms. Determination of velocity ratios. Particular attention is paid to problems relating to motions of gearing, steam-engine mechanisms, parallel motions of indicators, governors, link motions, valve gears, and indicator riggings. *Fall term, full study.* Mr. WOOD.

Required : Math. 2, 4, 6 ; Mechanical Engineering 1, 2, 4.

6. STEAM ENGINES AND BOILERS.—A study of the details of modern engines and boilers and of the principles involved in their construction and operation. Text-books used are : *The Steam Engine, Holmes*, and *A Treatise on Steam Boilers, Wilson-Flather. Winter term, full study.* Mr. WOOD.

Required : Math. 2, 4, 6 ; Theoretical and Applied Mechanics 1.

7. THERMODYNAMICS.—The fundamental principles underlying the transformation of heat into work, more especially as exemplified in the steam engine, are carefully studied. Considerable attention is paid to the solution of numerous examples, such as will arise in steam, air, or gas engineering. Drill is given in the rapid and accurate use of standard steam tables. *Fall term, full study.* Professor BRECKENRIDGE.

Required : Math. 7, 8, 9 ; Theoretical and Applied Mechanics 1 ; Physics 1, 3.

8. MECHANICS OF MACHINERY.—This is a study of the theoretical principles involved in the construction of such machinery as comes under the head of hoisting apparatus,

pumping engines, air compressors, fans, blowers, machinery for transmitting power, locomotives, pile drivers. *Winter and spring terms, full study.* Professor BRECKENRIDGE.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 5, 6, 7, 11.

9. MACHINE DESIGN.—This work follows the design of a high-speed steam engine, and comes under two heads.

Advanced Design: Under this head the work begins with simple machines and extends to more difficult designs as the student progresses. The design of attachments to existing machines, or the complete design of some machine that can be built in the shops, is often a part of this work. Such designs as hoists, pumps, drills, lathes, shapers, water motors, etc., are undertaken, and the student gains the same information that he would in commercial offices for this kind of work.

Original Design: In this work the student's previous training in designing is combined with his inventive ability, and often valuable and ingenious work is done. The machines are to be designed for accomplishing a certain prescribed work. Often but a single piece is handed the student, and a machine is required to produce a given number of these pieces per hour.

A large amount of study of existing machines is required. The student is taught to consult the standard works on designing, such as *Unwin*, *Reuleaux*, *Klein*, *Marks*, *Richards*, and to use such pocket books as *Kent*, *Nystrom*, *Haswell*, *Taschenbuch der Hütte*, etc. *Winter and spring terms, full study.* Assistant Professor VANDERVOORT and Professor BRECKENRIDGE.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 1 to 8, and 11.

10. ESTIMATES.—Calculations and estimates are made as to the cost of machinery, power, plants, boilers, chimneys, systems of piping, engines and their foundations, different methods of power transmission.

Also forms of contracts and specifications are studied. *Spring term, full study.* Assistant Professor VANDERVOORT.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 1 to 6, 9, 11, 12.

11. VALVE GEARS AND STEAM-ENGINE DESIGN.—Under this head the steam engine is carefully studied in all its details. A series of plates is drawn showing for the minimum, average, and

maximum horse power the pressure of steam on the piston at all points of the stroke, the pressure at cross head, crank pin, crank shaft at all crank angles; taking into account the forces of inertia combined with the steam pressures—counterbalancing crank disc, weight of fly wheel. Each part of a complete engine is designed, and detailed drawings made and traced, so that each member of the class may have a complete set of blue prints. The work in valve gears will be done partly by recitations and partly by drawing room work. The application of graphical diagrams as an aid in the study and design of valves for engines is carefully brought out. *Fall term, full study.* Assistant Professor VANDERVOORT.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1, 2; Mechanical Engineering 1 to 7.

12. MECHANICAL ENGINEERING LABORATORY.—This work is a continuation of the work begun during the last term of the junior year. It consists of a study of such instruments as are found in the mechanical engineering laboratory, methods of using and calibrating scales, thermometers, gauges, indicator springs, planimeters, counters, calorimeters, brakes, etc. Experiments are made with engines, pumps, injectors, boilers, motors, etc., to determine under what conditions they may be expected to give a maximum efficiency. A limited amount of commercial testing may be undertaken. Tests of plants in the vicinity are made a feature of this work. Carefully prepared reports are always required. Special investigations and research are undertaken as far as possible. *Fall and winter term, full study.* Professor BRECKENRIDGE and Mr. WOOD.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 1 to 7, 11.

COURSES FOR GRADUATES

PRIMARY

101. Advanced Machine Design, 1, 2, or 3 credits.
102. Graphics and Kinematics, 1 credit.
103. Mill Engineering, 1 credit.
104. Steam Engineering, 1, 2, or 3 credits.
105. Experimental Engineering, 1 credit.
106. Thermodynamics, 1 credit.
107. Pneumatics, 1 credit.

108. Hydraulic Machinery, 1 credit.

109. Mechanical Technology, 1 credit.

110. Translation of Technical Engineering work, 1, 2, or 3 credits.

SECONDARY

111. Any primary offered in the College of Engineering, 1 credit. Primary subjects which may be taken as secondary in any course for the Master's Degree in the College of Engineering.

MECHANICS, THEORETICAL AND APPLIED.

1. ANALYTICAL MECHANICS.—The mechanics of engineering, rather than that of astronomy and physics, is here considered, with a view to the future needs of the student of engineering. In addition to fixing the fundamental concepts and demonstrating the general principles of equilibrium and motion, application of principles and methods is made to numerous and varied engineering problems in such a way that the student must discriminate in the use of data and in the statement of conditions, and so obtain a working knowledge of the subject. The methods of the calculus are used whenever preferable. As mathematical processes and forms express most readily and quickly the rules and methods of work, the training in this direction is important. This subject requires a thorough working knowledge of the mathematics preceding it in the course.

Outline of the subject: Nature and measure of force; composition and resolution of forces; moments; conditions of equilibrium; resultant of systems of forces; centre of gravity; moment of inertia; rectilinear and curvilinear motion, and the relation between such motion and the constraining and accelerating forces; dynamics of a rigid body; momentum and impact; work, energy, and power; mechanical advantage; friction. *Bowser's Analytical Mechanics. Fall term, full study.* Professor TALBOT.

Required: Math. 2, 4, 6, 7, 8, 9.

2. RESISTANCE OF MATERIALS.—In the treatment of this subject it is the aim to give the student a thorough training in the elementary principles of the mechanics of materials, to follow with such experiments and investigations in the testing

laboratory as tend to verify the experimental laws, and to add such problems in ordinary engineering practice as will train the student in the use of his knowledge. Attention is also given to the quality and requirements for structural materials.

Outline of the subject: Elasticity of materials; stresses and strains; experimental laws; working strength for different materials; resistance of pipes and riveted joints; bending and resisting moment; shear and elastic curve of cantilever, simple, restrained, and continuous beams; column formulas; torsion, and shafts; maximum internal stresses in beams; fatigue of metals; working strength for repeated stresses; resilience; reliability of the common theory of flexure, as shown by actual experiment; design and strength of rolled and built beams and columns; specifications for materials and methods of testing. *Merriman's Mechanics of Materials. Winter term, full study.* Professor TALBOT.

Required: Math. 2, 4, 6, 7, 8, 9; Theoretical and Applied Mechanics 1.

3. HYDRAULICS.—In hydraulics the instruction is by textbook and laboratory work. The laws of the pressure and flow of water and its utilization as motive power are considered. Experimental work in the hydraulic laboratory gives training in the observation and measurement of pressure, velocity, and flow, and in the determination of experimental coefficients.

The subject covers the following: Weight and pressure of water; head; centre of pressure; velocity and discharge through orifices, weirs, tubes, nozzles, pipes, conduits, canals, and rivers; measurement of pressure, velocity, and discharge; meters and measurements; motors, turbines, and water wheels; water power and transmission of power. *Merriman's Hydraulics. Spring term, full study.* Professor TALBOT.

Required: Math. 2, 4, 6, 7, 8, 9; Theoretical and Applied Mechanics 1, 2.

4. APPLIED MECHANICS.—To be taken instead of Analytical Mechanics. The course of study and topics studied will be nearly identical. *Peck's Elementary Mechanics. Fall term, full study.* MR. MCLANE.

Required: Mathematics 2, 4, 6.

5. STRENGTH OF MATERIALS.—To be taken instead of Resistance of Materials. The course of study will be nearly the same, though somewhat simplified, *Merriman's*

Mechanics of Materials. Winter term, full study. Associate Professor Myers.

Required: Mathematics, 2, 4, 6; Theoretical and Applied Mechanics 4.

COURSES FOR GRADUATES

Theoretical and Applied Mechanics

101. Analytical Mechanics.
102. Resistance of Materials.
103. Hydraulics and Hydraulic Engineering.
104. Laboratory of Applied Mechanics.

METEOROLOGY

1. Meteorology.—The study of those atmospheric movements which bring changes of weather and the relations of these movements to heat, cold, electrical conditions, wind, cloud, barometric pressure, etc., constitutes the work of the first half of the fall term. Abercrombie's *Weather* is used as an introductory text-book; but most of the instruction is given by lectures, the study of charts. Attempts are made by the student to forecast weather changes. *Fall term, two-fifths study.* Professor Rolfe.

Required: Chemistry 3b; Physics 1 or 2.

MILITARY SCIENCE

1. Drill Regulations.—For all male students. First term: school of soldier; bayonet exercise; second term: school of company, close and extended order. *Fall and winter terms, one-fourth study.* Professor Brush.

2. Practical Instruction in School of Soldier.—Company and battalion in close and extended order; school of the cannoneer and of the battery dismounted; target practice. Freshmen and sophomore years; *six terms, counts one and one-half studies.* Professor Brush.

3. Recitations and Practice for Officers and Non-Commissioned Officers.—*Sophomore year:* School of the battalion, close and extended order; ceremonies; review and

inspection; military signaling; guard, outpost, and picket duty *Junior year:* military administration; reports and returns; theory of firearms and target practice; organization of armies; field fortifications; art of war. *Seven terms, recitations 1 to 2 hours a week; drill 2 hours a week.* Professor BRUSH. This course is obligatory upon officers and non-commissioned officers, and open to others.

MINERALOGY

1. ELEMENTS OF MINERALOGY.—The first term's work is intended to be a general introduction to the subject. Instruction includes lectures and laboratory practice. In the lectures, which occur on specified days (2 or 3) each week, such subjects as follow are discussed: genesis of minerals; conditions favoring their deposition; origin of the massive and crystalline forms; relationships of minerals and their classification; the physical properties of minerals; as color, luster, hardness, gravity, streak, etc., with the conditions which may cause these properties to vary; elements of crystallography, etc.

In the laboratory the student is first made acquainted with the simplest trustworthy methods for proving the presence or absence of the acids and bases. He is then required to determine a large number of species by their physical and chemical properties only. *Fall term, full study.* Professor ROLFE and Mr. MOSIER.

Required: Chemistry 1.

2. ADVANCED MINERALOGY.—Crystallographic Mineralogy. During the second term a careful study of the forms of crystals is made, including the measurement of angles and determination of complex forms. The student is also required to identify many species of minerals by their crystalline forms, and to verify his conclusions by the methods in use during the preceding term.

Optical Mineralogy. The work of the third term will be devoted to the microscopic determination of rock forming minerals; to methods for separating the mineral constituents of fine grained rocks, etc. *Winter and spring terms, full study.* Professor ROLFE and Mr. MOSIER.

Required: Mineralogy 1.

MUNICIPAL AND SANITARY ENGINEERING

1. ROAD ENGINEERING.—Instruction is given by means of text-books and lectures. The value and importance of road improvement in country highways and the best means of securing it are considered, together with the principles and details of construction of earth, gravel, and macadam roads. In city streets, the methods of construction, cost, durability, and desirability of the various kinds of pavement, and the question of grades, cross-sections, methods of assessment of cost, and methods of maintenance and cleaning are treated. *Lectures and reading. Winter term, with Civil Engineering 4, makes a full study.* Assistant Professor PENCE.

Required: Math. 4; General Engineering Drawing 1, 2; Civil Engineering 1, 2, 3, 4.

2. WATER SUPPLY ENGINEERING.—This subject is intended to cover the principal features of the construction of water works, including the tests and standards of purity of potable water; the choice of source of supply; the designing of the distribution system, pumps and pumping machinery, reservoirs, stand-pipes, and the filtration of water. *Lectures; Fanning's Water Supply Engineering. Fall term, full study.* Professor TALBOT.

Required: Theoretical and Applied Mechanics 1, 3; Chemistry 1; Mechanical Engineering 6.

3. SEWERAGE.—The design and methods of construction of sewerage systems for cities, including the following: Sanitary necessity of sewerage; water carriage systems, both separate and combined; surveys and general plans; hydraulics of sewers; relation of rainfall to storm water flow, and determination of size and capacity of sewers; house sewage and its removal; form, size, design, and construction of sewers and sewer appurtenances; modern methods of sewage disposal by filtration, chemical precipitation, irrigation, etc., with resultant changes in the sewage; garbage disposal; general sanitation; estimates and specifications. *Lectures; Staley and Pierson's Separate System of Sewerage. Winter term, full study.* Professor TALBOT.

Required: Theoretical and Applied Mechanics 1, 3; Chemistry 1.

4. BOTANY.—This is a study of the lowest orders of plants, including such species as are most commonly met with in

microscopical examinations of water, and found associated with putrescent substances. Lectures or recitations and microscopical laboratory work. This is practically the same as the first part of the second term of Botany 1, in the College of Science. *Winter term, half study.* Professor BURRILL.

5. BACTERIOLOGY.—For students in course in municipal engineering. This course includes the identification and classification of bacteria, and of allied organisms, their relations to health and to disease, the methods of separation and cultivation, and the methods of air and water analysis The laboratory is furnished with sterilizers, culture ovens, microscopes, etc., and students have abundant opportunity to do practical work. This is at first the same as Bacteriology 1, in the College of Science, but in the latter part of the term special investigations are undertaken by the engineering students. *Fall term, full study.*
Professor BURRILL.

Required : Municipal and Sanitary Engineering 4.

MUSIC

Only Course 1 may be taken for credit for the regular degree by students in the College of Literature and Arts, and then only if they are at the same time enrolled in the department of music.

1. HISTORY OF MUSIC.—Lectures on the development of music from its beginning among the Greeks to the present day, including the rise of dramatic music, the origin and progress of the oratorio, the evolution and development of instrumental forms, and studies in the lives of the composers. Assigned collateral readings. *Fall, winter, and spring terms, three-fifths study.* Assistant Professor JONES.

2. THEORY OF MUSIC.—*First :* A course in harmony, two hours a week, in class, through four terms. *Emery's Harmony* with additional exercises. *Weitzman's Theory of Music.*

Second : A course in counterpoint, two hours a week in class through two terms. *Richter's Counterpoint.*

Third : A course in fugue, two hours a week in class through two terms. *Richter's Fugue.*

Fourth : A course in musical analysis which may be taken at the same time with the studies in counterpoint and

fugue. The second, third, and fourth parts of this course are open only to advanced students showing special aptitude. Assistant Professor JONES.

3. (*a*) COURSE FOR THE PIANO.—PREPARATORY. This course is equivalent to three years' work. It includes formation and position of fingers, hands, wrists, and arms, properties of touch, principles of technique, thorough drill in scale and arpeggio playing, and exercises in accent, rhythm, and expression. Music used: Herz, Scales and Exercises; Loeschhorn, Op. 65, 66; Lemoine, Op. 37; Heller, Op. 45; Bertini, Op. 29, 32; Czerny, Op. 299, Bks. 1, 2; Bach's Little Preludes; also sonatinas and easier sonatas and compositions by Clementi, Kuhlau, Haydn, Mozart, Mendelssohn, Merkel, Dussek, Diabelli, Grieg, Bargiel, and others.

(*b*) COLLEGIATE.—*First Year.*—Studies in development of tecnique: Czerny, Op. 299, Bks. 3, 4; Czerny, Octave Studies; Cramer, Etudes; Jensen, Etudes; Bach, Two-Voice Inventions and French Suites; Sonatas of Haydn and Mozart; easier Sonatas of Beethoven; Songs Without Words, Mendelssohn; Compositions (smaller works) of Beethoven, Chopin, Schubert, Raff, Grieg, Chaminade, Moszkowski, and others.

Second Year.—Daily technique; Czerny, Op. 740; Bach, Three-Voice Inventions and English Suites; Sonatas and other Compositions of Scarlatti, Beethoven, Schubert, Schumann, Mendelssohn, Weber, Raff, Rubinstein, St. Saens, Godard, MacDowell, and others.

Third Year.—Selections: Clementi, Gradus ad Parnassum; Moscheles, Op. 70; Kullak, Seven-Octave Studies, Bk. 2; Bach, Well-Tempered Clavichord; Sonatas and Concertos by Mendelssohn, Weber, Beethoven, Hummel, Brahms, etc.; selections from works of Bach, Chopin, Schubert, Schumann, Brassin, Rubinstein, Liszt, Moszkowski, Scharwenka, and other modern composers.

Fourth Year.—Selections: Octave Studies; Clementi, Gradus, Continued; Bach, Well-Tempered Clavichord, Continued; Chopin, Etudes; Henselt, Etudes; Rubinstein, Etudes; Sonatas by Beethoven, and Concertos and other Compositions by the great masters, classic and romantic, both of the older and the more modern schools. Assistant Professor JONES.

4. COURSE FOR THE ORGAN.—A similar preparatory and collegiate course for the organ will be offered for any one caring

to make this the principal instrument. Assistant Professor JONES.

5. COURSE FOR THE VOICE.—A preparatory and collegiate course in vocal culture is also offered, similar in outline to the above courses. Miss ROWLEY.

PALEONTOLOGY

ADVANCED PALEONTOLOGY.—The work outlined under Geology 1d. can do little more than introduce the general subject. To those who desire a better acquaintance with paleontology a course of two terms is offered.

This course will include: (a) Discussion of the biological relations of fossil forms along the lines indicated in Williams's Geological Biology; (b) a discussion of the principles of classification as applied to fossils, together with the characteristics which distinguish the larger groups, using Nicholson and Zittel as guides; (c) a study of the distribution and variations of the genera and species of one or more of the more important groups as illustrated by the collections of the University, using the various state reports and Miller's Handbook as aids. *Winter and spring terms, full study.* Professor ROLFE and Mr. MOSIER. A major in Botany and Zoölogy would aid the student greatly in this work, but neither is absolutely required.

Required: Geology 1.

PEDAGOGY

1. THE PSYCHOLOGY OF THE TEACHING PROCESS.—(a) The nature and organic elements of the process deduced and exemplified in various subjects. (b) The principles of school organization and management derived from the foregoing, with a special study of the recitation in which the teaching process realizes itself. (c) The field of pedagogical inquiry mapped as a basis and guide to further study. *Fall term, full study.* Professor TOMPKINS.

2. THE AIM OR MOTIVE, IN TEACHING.—(a) The true, or universal aim, as determined by the nature of life. (b) The various aims as consciously or unconsciously held at present by different countries and classes of people. Such diversity accounted for and unified. (c) The aim as shown in variation

through historical development—the history of educational ideals. *Winter term, full study.* Professor TOMPKINS.

Required: Pedagogy 1.

3. THE UNIVERSAL FORM OF METHOD IN EDUCATION, as determined by the nature of life. (a) In its subjective aspect. (b) In its objective aspect. (c) The three forms of the relation of "a" and "b," giving rise to the logic, ethics, and esthetics of education—the fundamental educational categories. *Spring term, full study.* Professor TOMPKINS.

Required: Pedagogy 2.

4. THE UNIVERSAL LAW AND PROBLEM OF THINKING.—Special movements of the mind in learning discriminated. (1) How to think objects into organic unity. (2) How to think objects into class unity. *Fall term, full study.* Professor TOMPKINS.

Required: Pedagogy 3.

5. THE LOGICAL AND THE PSYCHOLOGICAL FACTOR IN EDUCATIONAL METHOD; that is, the foregoing process modified by the psychological factor. (a) The sketching of lessons in recognition of the two factors. (b) The course of study as determined by the two factors—the logical and chronological arrangement of studies. *Winter term, full study.* Professor TOMPKINS.

Required: Pedagogy 4.

6. SPECIAL METHODS IN THE COMMON SCHOOL SUBJECTS, as determined by the logic of the subject and by the learning mind. These exemplify in concrete operation all the foregoing laws. *Full study, spring term.* Professor TOMPKINS.

Required: Pedagogy 5.

7. SPECIAL METHODS IN HIGH SCHOOL SUBJECTS.—In this, the student may select the subject in which he is especially interested, and the instruction, so far as practicable, will be given by the regular teacher of the subject chosen. Thus each student may spend a term in the pedagogy of his chosen subject. At stated intervals, all will meet the professor of pedagogy to compare notes, and to keep duly emphasized the universal laws of pedagogy. *Fall term, full study.* Professor TOMPKINS.

Required: Pedagogy 6.

8. INVESTIGATIONS.—Students may now select experimental psychology or child study, or continue some line of

work of the preceding term in which they are especially interested. The class will meet to compare notes as before. *Winter term, full study.* Professor TOMPKINS.

9. THE SCHOOL THE INSTRUMENT OF EDUCATION.—(a) Connected with and differentiated from the other social institutions. (b) The inherent law of the school ascertained. (c) School organization as determined by the law. (d) School management and supervision under the law. *Spring term, full study.* Professor TOMPKINS.

COURSES FOR GRADUATES

101. THE PHILOSOPHY OF EDUCATION.—Its nature, scope, power, and basis. Education in its Ethical, Logical, and Esthetic aspects—the fundamental categories of life and learning.

102. PHILOSOPHY AND EDUCATION.—The relations of systems of philosophic thought to educational ideals and methods, including the history of educational theories and methods.

103. SCHOOL MANAGEMENT.—The philosophy of school organization, management, and supervision, including the course of study as the complex process of education.

PHARMACY

1. GENERAL PHARMACY.—This course is intended as an introduction to the theory and practice of pharmacy.

Instruction is given by means of lectures and text-books, with recitations upon the history of pharmacopœias, weights, and measures, specific gravity, and the general operative methods of pharmacy; problems in calculating formulas in parts by weights and percentage strengths, chemical proportions, etc. *Remington's Practice of Pharmacy. Fall term, full study.* Mr. SANDFORD.

2. PHARMACEUTICAL PREPARATIONS.—This is a course of practice in manufacturing samples of the various official and unofficial preparations. The student is not required to prepare a great number of each class, but as it is necessary to have sufficient practice to become expert in the manipulation involved, he must make as many as will accomplish that end.

Accompanying the laboratory work is a study of all the official and the important unofficial preparations, recitations

from text-books, lectures and laboratory work. *U. S. Pharmacopœia; National Formulary; U. S. and National Dispensatories. Winter and spring terms, full study.* Mr. SANDFORD.

Required: Chem. 1; Pharmacy 1.

3. PHARMACOGNOSY.—This course is intended to acquaint the student thoroughly with the chemicals and drugs found in the pharmacy and used by the medical profession. The work begins with comparative studies of the salts, etc., used in medicine, and of the methods of readily distinguishing between chemicals of like appearance. At the same time their physiological action, dose, sources, and methods of manufacture, are considered in a general way. Following this, the organic materia medica is taken up, and includes a complete study of animal and vegetable drugs, and their pharmacopœial, English, and common names. By continued practice at the desks, the student becomes familiar with all the roots, leaves, seeds, barks, etc., in use, and by the aid of a lens and pocket-knife should become able to recognize any of the substances employed in the practice of pharmacy. *Sayer's Organic Materia Medica and Pharmacognosy; U. S. Pharmacopœia. First year, fall term, three-fifths study; winter and spring terms, two-fifths study.* Mr. SANDFORD.

4. PHARMACEUTICAL TECHNOLOGY.—The sources, manufacture, uses, etc., of the inorganic and organic substances used in pharmacy. Impurities and the means of detecting them. Official standards of purity and strength. Prescription reading and practice. The Latinity of prescriptions, study of incompatibilities, and rules for dispensing.

Finally, a general review of the two years' work in pharmacy is given as a partial preparation for the examination required by the State Board of Pharmacy for registration as pharmacists. *U. S. and National Dispensatories; U. S. Pharmacopœia; Remington's Practice of Pharmacy. Fall and winter terms, full study.* Mr. SANDFORD.

5. PHARMACEUTICAL ASSAYING.—One term's work, mainly devoted to proximate analysis of organic compounds and mixtures of natural occurrence or of other origin. The work is both qualitative and quantitative, and includes determinations of the more important alkaloids, carbohydrates, acids, and other essential constituents of organic substances. *Dragen-*

dorf's Plant Analysis; Prescott's Organic Analysis; Allen's Commercial Organic Analysis; Lyon's Pharmaceutical Assaying. Spring term, full study. Mr. Sandford.

Required: Chemistry 4.

6. Pharmaceutical Botany.—See Botany 7.

7. Pharmacology.—In connection with pharmacognosy, which considers drugs merely from the pharmacist's standpoint, courses in pharmacology are offered.

It is the special purpose of these courses to afford students who are preparing for the study of medicine opportunity to acquire needful knowledge of materia medica.

Medicines are classified according to their therapeutical uses and value. The articles of materia medica which are most frequently employed and are of most value in the practice of the physician, are given most careful study. The more recent drugs, as well as the synthetically prepared chemical products, are commented upon. Careful attention is also given to poisons and their antidotes, to systems of dosage, and to emergency methods. Lectures and recitations. *Farquharson's Guide to Therapeutics. Fall and winter terms, full study.* Mr. Sandford.

PHILOSOPHY

1. Outlines of Philosophy.—This course is offered for the benefit of students who can give only a single term to the study of philosophy. It is designed primarily to meet the wants of science students who desire some knowledge of the subject. The most important problems in philosophy and metaphysics are presented. Lectures and prescribed reading. *Fall term, full study.* Assistant Professor Daniels.

2. Ancient and Mediæval Philosophy.—A rapid survey is taken of the development of speculative thought, beginning with the early Greek philosophers and continuing through the mediæval period. *Winter term, three-fifths study.* Assistant Professor Daniels.

3. Modern Philosophy.—This course considers the formation and development of the problems and conceptions in philosophy from Descartes to the present time. Selections from the philosophical masterpieces of this period are carefully

studied. Special emphasis is laid upon the philosophy of Kant. *Spring term, full study.* Assistant Professor DANIELS.

4. METAPHYSICS.—This course consists of a somewhat critical and thorough study of subjects of special prominence in philosophy; *e. g.*, realism, idealism, and the theory of knowledge. No text-book is used. Topics are assigned and papers, prepared by the students, are read and discussed in the class. To promote acquaintance with current philosophical thought various articles on different aspects or problems of modern philosophy are read and criticised. *Winter term, two-fifths study.* Assistant Professor DANIELS.

5. ADVANCED PHILOSOPHY.—The work consists in a critical study of *Lotze's Microcosmus*, together with supplementary readings and discussions upon suggested topics. The course is designed for somewhat advanced students, and is open to those who have received at least two credits in philosophy. *Fall and winter terms, full study.* Assistant Professor DANIELS.

Required: Philosophy 2, 3, 4.

6. PRACTICAL ETHICS.—In this course those questions which bear the closest relation to life and conduct are raised and discussed. The duties of the individual, the family, and the state are among the subjects considered. Special subjects in social ethics may be taken up, including the duties of society to the unfortunate and delinquent classes. *Spring term, two-fifths study.* Assistant Professor DANIELS.

7. HISTORY AND CRITICISM OF ETHICAL THEORIES.—A careful and historical examination of the various types of ethical theory, including rational, hedonistic, eudemonistic, esthetic, and evolutional ethics. It is designed to make the student as familiar as the time allows with the writings of representative men of the various schools. *Spring term, three-fifths study.* Assistant Professor DANIELS.

8. LOGIC.—This course aims to give a knowledge of the principles of deductive and inductive reasoning. Special attention is given to fallacies and to the problems, grounds, and principles of induction. The study is designed not only to direct the student in practical reasoning and correct thinking, but also to familiarize him with the principles and methods of scientific investigation. *Spring term, full study.* Assistant Professor DANIELS.

9. CONTEMPORARY PHILOSOPHICAL THOUGHT.—The aim of this course is to present the philosophical views of several thinkers of the present time. Special attention is given to the philosophy of Herbert Spencer. Lectures and prescribed reading. *Fall term, full study.* Assistant Professor DANIELS. *Required:* Philosophy 1, 2, 3.

COURSE FOR GRADUATES

101. THE PHILOSOPHY OF KANT.

PHYSICAL TRAINING

FOR MEN

1. GYMNASIUM AND FIELD PRACTICE required in winter term twice a week, as part of military science. One-fourth credit counted with the latter subject. Assistant Professor EVERETT.

2. LECTURES AND PRACTICAL DEMONSTRATIONS.—This course is offered to students who wish to gain a better comprehension of the value of physical exercise, its use and abuse, how to train properly for athletic contests, and thus to avoid the ill-effects which too often follow a course of athletic training. It is hoped that by thus connecting the theoretical and practical work, better results will be obtained in the department.

During the fall term the subject of applied anatomy receives attention—the muscles and their action, with the various methods of developing their power; first aid to the injured; how to prevent and correct physical deformities; specific exercises and their effects on the organs of the body, etc.

In a similar manner, during the winter term, special physiological instruction is given upon such topics as the following: The effects of exercise and training on the action of the heart, lungs, and other vital organs; diseases from overwork, their prevention and cure; personal hygiene, sleep, diet, exercise, bathing, clothing, colds, tobacco, and alcohol. *Once a week. Fall and winter terms, one-fifth study.* Assistant Professor EVERETT.

FOR WOMEN

3. GYMNASIUM AND FIELD PRACTICE, three times a week and instruction in applied anatomy, physiology, and hygiene

once a week when required. *Fall, winter, and spring terms, one credit each year.* Miss Morrison.

FOR MEN AND WOMEN.

4. Hygiene.—A course designed to impart a knowledge of the conditions of bodily health and activity. Among the more important subjects treated may be named the theory of bodily exercise, ventilation and heating, the composition and relative nutrient value of foods, and the causes and methods of communication of contagious diseases. The course deals with those practical hygienic problems of everyday life that are wholly or in large part under the control of each individual. *Fall and winter terms, one-fifth study.* Associate Professor Summers.

Required: University examination in entrance physiology or its equivalent.

PHYSICS

1. General Descriptive Physics.—Lectures. This course is designed for those who wish to gain a knowledge of the more important phenomena and laws of physical science, and of the means for exhibiting, studying, and applying such laws. Prescribed for students in the College of Engineering. *Three times a week. Fall, winter, and spring terms, two-fifths study.* Assistant Professor Sager

Required: Math. 3 or 4.

2. Elementary Physical Measurements.—Lectures and Laboratory. This course is designed for those who wish to become acquainted with the simpler methods used in the qualitative and quantitative study of physical phenomena. Lectures twice a week; laboratory, three periods of 3 hours each week. *Winter term, full study.* Assistant Professor Sager.

3. Advanced Physical Measurements.—Laboratory. This course is designed for those who wish to study quantitatively by the aid of the more accurate scientific methods, the chief phenomena and laws of physical science. Prescribed for students in the College of Engineering, and must be taken by them in the same year with Physics 1. *Once a week. Fall, winter, and spring terms, three-fifths study.* Mr. Quick.

Required: Math. 3 or 4.

4. Advanced Electrical Measurements.—Lectures and laboratory. This course is a discussion of the theory of electricity and magnetism, particularly with respect to electrical and magnetic units, and electrical measuring instruments, together with laboratory work in advanced problems in electrical measurements. Prescribed for students in electrical engineering. *Fall, winter, and spring terms, one-half study.* Assistant Professor Sager and Mr. Moore.

Required: Physics 1 and 3; Math. 7, 8, 9.

5. Mathematical Theory of Electricity and Magnetism.—A general treatment of electro-statics, electro-dynamics, magnetism, and electro-magnetism. *Fall, winter, and spring terms, full study.* Assistant Professor Sager.

Required: Physics 1 and 3; Math. 7, 8, 9.

6. Mathematical Theory of Dynamics, Heat, Light, and Sound.—A general treatment of the more important problems of dynamics, heat, light, and sound. *Fall, winter, and spring terms, full study.* Assistant Professor Sager.

Required: Physics 1, 3; Math. 7, 8, 9.

7. Advanced Measurements in Dynamics, Heat, Light, and Sound.—Laboratory. *Fall, winter, and spring terms, full study.* Assistant Professor Sager and Mr. Quick.

Required: Physics 6.

8. Original Research.—Laboratory. *Fall, winter, and spring terms, full study.* Assistant Professor Sager.

Required: Physics 6, 7.

9. Thermodynamics and Electro-Chemistry.—This course will take up some work in physical chemistry leading to work on electro-chemistry. The work will be developed from considerations of thermodynamics. *Fall, winter, and spring terms, full study.* Mr. Moore.

Required: Math. 7, 8, 9; Chemistry 1.

PHYSIOLOGY (*Human*)

1. Major Course.—Taking as a basis the knowledge of the structure and physiology of mammals obtained in Zoölogy 1 or 3, there is made a systematic study of the differences, so far as they are of physiological import, between the anatomy of man and of the type mammal there studied; a more detailed study of the facts and methods of mammalian histology;

and finally, with as much fullness as the time will permit, a study of the special physiology of man. In the laboratory work the topics are selected to illustrate, so far as possible, the different methods of obtaining physiological data. *Winter and spring terms, full study.* Associate Professor SUMMERS.

Required: Chemistry 4; Zoölogy 3.

2. ADVANCED PHYSIOLOGY.—The first term is devoted to a study of the physiology of foods, digestion, and excretion, illustrating the application of chemical principles and methods to physiological research. The second term is given to a study of the blood, the circulation, and respiration. This involves principally the application of physical methods and practice in the use of instruments of precision. The third term is occupied with a study of the general physiology of muscle, and the special anatomy and physiology of the nervous system. *Fall, winter, and spring terms, full study.* Associate Professor SUMMERS.

Required: Physiology 1; Physics 1.

3. INVESTIGATION AND THESIS.—An opportunity for original investigation, upon which may be founded the graduating thesis, is offered to students in their senior year. While the instructor has general supervision of this work, it is expected that the student will at all times take the initiative, seeking only such information and advice as he would ask of any co-worker in his department of science. *Winter and spring terms, full study.* Associate Professor SUMMERS.

Required: Physiology 1, 2.

4. MINOR COURSE.—This course is planned for literary students and for students of natural science specializing in other lines. While some attention is paid to all the important processes of the body, special emphasis is laid upon those facts that serve as a basis for practical hygiene. *Fall term, full study.* Associate Professor SUMMERS.

Required: Chemistry 1.

POLITICAL SCIENCE

1. POLITICAL INSTITUTIONS.—Comparative study of modern political systems, their historical development and practical operation. Lectures, assigned readings, reports, and

discussions. *Fall, winter, and spring terms, three-fifths study.* Assistant Professor TOOKE.

2. JURISPRUDENCE.—Elementary course in the origin, development, and classification of law, followed by an introduction to the fundamental principles of the English Common Law. *Fall and winter terms, two-fifths study.* Assistant Professor TOOKE.

3. ROMAN LAW.—Early history. The classical jurisprudence. Legislation of Justinian. Influence of the Roman system. Readings and lectures. *Winter and spring terms, two-fifths study.* Assistant Professor TOOKE.

Required: A reading knowledge of Latin.

4. INTERNATIONAL LAW.—Sources and historical development. Essential powers of states, their rights and their obligations. Laws and usage in time of war. History of American diplomacy. *Fall, winter, and spring terms, two-fifths study.* Assistant Professor TOOKE.

Required: Political Science 1.

5. COMPARATIVE ADMINISTRATIVE LAW.—General principles of administrative law of the United States (national and commonwealth), England, France, and Germany. The appointment, tenure, and duties of officers. Historical and comparative study of local government. *Fall, winter, and spring terms, two-fifths study.* Assistant Professor TOOKE.

Required: Political Science 1 and 2. [*Not given in 1896-97.*]

6. COMPARATIVE CONSTITUTIONAL LAW.—A comparison of the constitutions of the leading states of Europe, and of North and South America, special attention being paid to the constitutional law of the United States, England, Germany, and France. *Fall, winter, and spring terms, two-fifths study.* Assistant Professor TOOKE.

Required: Political Science 1, 2.

7. LAW OF MUNICIPAL CORPORATIONS.—History and legal status of the American municipality. To supplement course 5. *Fall and winter terms, two-fifths study.* Assistant Professor TOOKE. [*Not given in 1896–97.*]

8. LAW OF TAXATION.—Nature of the taxing power. Constitutional limitations. Procedure of tax administration. Remedies open to tax payers. *Spring term, two-fifths study.* Assistant Professor TOOKE.

9. Seminary of Constitutional Law.—Open to graduates and to seniors taking course 6. The general subject for 1896–97 will be a study of the principles established by the leading decisions of the Supreme Court of the United States. *Fall, winter, and spring terms, two-fifths study.* Assistant Professor Tooke.

PSYCHOLOGY

1. General Psychology.—In this course are considered the more general problems of the mental life of the normal individual, especially those that have a living interest for the student, and find illustration in his every day life. Among the topics discussed the following are the principal: Relation of mental activity to bodily changes, sensation, habits, attention, memory, imagination, association of ideas, reasoning, instinct, emotion, will, localization of cerebral functions, time relations of mental phenomena. The course is amply illustrated by the use of apparatus, charts, prepared tissue, and photographs. Endeavor is made to give the class the more important results of recent researches, and the course is made to comprise the results of both the introspection and laboratory methods. *Fall term, full study.* Assistant Professor Krohn.

2. Laboratory Psychology.—This course is made up of lectures and laboratory work, with assigned reading. The class performs a series of about one hundred experiments to illustrate the time relations of mental processes, the influence of mind and body upon each other, and the psychic factors in sensation. The current literature in this field is discussed in the class, and made the basis of reports and reviews on the part of the students. *Winter and spring terms, three-fifths study.* Assistant Professor Krohn.

3. Comparative Psychology.—This course embraces the study of the lower mental activities as manifested in the life of various animals. The object of the course is to trace the development of mind along the animal scale, ranging from the lower forms to the more complex mental phenomena in the conscious life of man. *Romanes and Lloyd-Morgan. Spring term, two-fifths study.* Assistant Professor Krohn.

Required: Psychology 1, 2, or 9.

4. EDUCATIONAL PSYCHOLOGY.—In this course are discussed the growth and development of the mind, especially with reference to the first years of childhood. The attempt is made to devise methods by means of which the contents of a child's mind may be determined at any period of its development. Thus the various methods of testing and training the memory, attention, and other mental powers, will be submitted and employed in actual observations, upon which notes will be made for discussion in class. The order in which the various mental capacities unfold will also form an important theme for study. The course is thoroughly practical in its nature. *Krohn's Practical Lessons in Psychology. Fall term, two-fifths study.* Assistant Professor KROHN.

5. PSYCHOLOGY OF CRIME.—This course consists of a special study of the criminal as a morbid individual in comparison with the normal person. *Spring term, two-fifths study.* Assistant Professor KROHN.

Required: Psychology 1, 2, or 9.

6. PSYCHOLOGY OF ABNORMAL TYPES.—In this course the following, among other subjects, will be studied: The chief forms of mental diseases or types of insanity, the diseases of memory, the diseases of language, the diseases of will, double personality, peculiar dreams, hallucinations, illusions and delusions. The life of the blind, deaf, and imbecile will be inquired into with a view to determine the best methods of education for these classes. *Winter term, three-fifths study.* Assistant Professor KROHN.

Required: Psychology 1, 2, or 9.

7. ADVANCED EXPERIMENTAL PSYCHOLOGY.—Work in this course is arranged for each student individually, and may involve a systematic review of the laboratory methods of some master work in experimental psychology, or it may involve original research. The aim is to give treatment to certain social problems, necessitating original research, and the verification of important features of earlier experiments. *Fall, winter, and spring terms, full study.* Assistant Professor KROHN.

Required: Psychology 2.

8. PSYCHOLOGICAL SEMINARY.—The subject and hour to be determined after consultation with those who apply. The work in this course is chiefly in the line of discussion of psychological topics and special investigation, as well as reports

on the recent psychological literature. All students pursuing major work in this department are required to take an active part in the seminary during their second year. *Once a week; 2 credits.* Assistant Professor KROHN.

9. ELEMENTARY PSYCHOLOGY.—A course of lectures for the purpose of acquainting the student with the elements of Psychology, with respect to its principal methods and main conclusions. *Winter term, full study.* Assistant Professor KROHN.

COURSE FOR GRADUATES

101. SPECIAL INVESTIGATIONS.—A research course consisting in the investigation of special problems, the nature and scope of these investigations to be determined after consultation.

RHETORIC

1. RHETORIC AND THEMES.—Required for students in the College of Literature and Arts. *Three hours a week; fall, winter, and spring terms.* The course counts for two credits. Assistant Professor T. A. CLARK and Miss BUTTERFIELD.

2. RHETORIC AND THEMES.—Required for students in the Colleges of Agriculture, Science, and Engineering. *Three hours a week; fall, winter, and spring terms.* The course counts for two credits. Assistant Professor T. A. CLARK and Miss BUTTERFIELD.

3. DAILY THEMES.—Higher English Composition. *Two hours a week; fall, winter and spring terms, full study.* Assistant Professor T. A. CLARK.

Required: Rhetoric 1 or 2.

4. ARGUMENT.—This course will be devoted to lectures and text-book work on the principles of argumentative discourse. Weekly practice in the writing of arguments will be required. *Winter term, full study.* Assistant Professor T. A. CLARK.

Required: Rhetoric 1 or 2.

SOCIOLOGY

[See under Anthropology, Anthropometry, and Economics.]

SPANISH

1. Grammar and Reading.—Edgren s Spanish Grammar; Knapp's Spanish Readings; Cervante's Don Quijote; outlines of Spanish literature. *Fall, winter, and spring terms, full study.* Assistant Professor Fairfield. [*Not given in 1896–97.*]

THEORETICAL AND APPLIED MECHANICS

[See Mechanics, p. 188.]

VETERINARY SCIENCE

1. Anatomy and Physiology.—The anatomy and physiology of the domestic animals constitute the subjects of instruction for one term. The instruction is given by lectures aided by demonstrations with use of skeletons, and of other apparatus as follows: Dr. Auzoux's complete model of the horse, which is in ninety-seven pieces and exhibits three thousand details of structure; papier-maché model of the horse's foot; the teeth of the horse at different ages; and dissections of animals. This work is supplemented with the study of text-books: *Strangeways' Veterinary Anatomy and Mills's Animal Physiology. Fall term, full study.* Professor McIntosh.

2. Principles and Practice of Veterinary Medicine.—This subject is taught by lectures and text-books on the diseases of domestic animals, and is illustrated with specimens of morbid anatomy and by observations and practice at the clinics. The latter are held at the veterinary infirmary once a week. The students assist in the operations, and thus obtain a practical knowledge of the subject. Dissections and post-mortems are made as cases present themselves. Text-books: *Diseases of Horses and Cattle, by D. McIntosh, and Williams's Practice of Veterinary Medicine and Surgery. Winter and spring terms, full study.* Professor McIntosh.

3. Veterinary Materia Medica.—This subject, which treats of all the agents used for the cure of disease or injury, or for the preservation of health among the domestic animals, is taught by lectures and text-books, illustrated by specimens of all the drugs used in veterinary practice. The compounding of medicines also receives attention. *Fall, winter, and spring terms, full study.* Professor McIntosh.

ZOÖLOGY

1. General Zoölogy, Major Course.—The work here described forms a continuous course, beginning in the winter term of the freshman year and ending with the fall term of the sophomore year. It is the immediate object of this course to lay the foundation for a working knowledge of zoölogy, and its secondary object to draw from zoölogical science its distinctive discipline as an element in a liberal education. It is planned with a view to giving students a wide acquaintance with the methods of zoölogical research in field, laboratory, and library, and a general acquaintance with zoölogical theory and the leading facts of observation and experiment upon which such theory rests. It is devoted especially to a series of laboratory studies of animal types, and to lectures on the morphology, physiology, and relations to nature of this selected series. It is divided into three sub-divisions consisting of one term each. The first term's work may be taken separately as a minor by students not in the natural science group.

a. The laboratory work of the first term includes dissections of the earthworm, serial sections of this form and of Hydra, and numerous studies and preparations of the Protozoa. Lectures on the structure, physiology, and classification of the Protozoa, their relations to plants and to the organization, embryological development, and history of the higher animals, are made to elucidate and illustrate the general theory of zoölogy, which is here presented in outline to be filled in and completed as the work proceeds. The general zoölogy of the remaining lower invertebrate forms, including Vermes, finishes the work of the term.

b. The second term is devoted to the morphology, physiology, and general classification of the remaining invertebrates, with principal attention to the Arthropoda. It is directed especially towards the entomological course of this department, and is required of all students expecting to take entomology. The laboratory work includes a special study of the crayfish, and of the embryology of the potato beetle, followed by a considerable amount of semi-independent work upon the invertebrate fresh water fauna of the region.

c. The third term's work is done on vertebrates, with principal attention in the laboratory to anatomical work on the

larger animals. The general method is that of comparative anatomy, with special reference to the anatomy of man, this part of the course being directed particularly towards the physiological courses of the University which follow upon it. Philosophical zoölogy takes the form in this term of a course of lectures on the general theory of organic development, illustrated by a systematic study by lectures and reading of the modern doctrine of the descent of man. *Winter, spring, and fall terms, full study.* Mr. FRANK SMITH (*a* and *b*) and Associate Professor SUMMERS (*c*).

Required: Chemistry 1. Art and Design 1 must be taken with this course if it has not been taken previously.

2. This course consists of the first and second terms' work of Zoölogy 1. It is intended especially to serve as a thorough zoölogical preparation for General Entomology (Zoölogy 6). *Winter and spring terms, full study.*

Required: Chemistry 1 and Art and Design (see course 1).

3. This course consists of the first and third terms' work of course 1. It is intended to serve as a thorough zoölogical preparation for Physiology 1, and is especially commended to students contemplating the study of medicine. *Winter and fall terms, full study.*

Required: Chemistry 1 and Art and Design (see Course 1).

4. EMBRYOLOGY.—Lectures, laboratory and reference work. This course begins with a study of the germ cells, and the processes of maturation, fertilization, cleavage, and gastrulation from preparations furnished to the student. The study of the development of the vertebrate form in the chick is then taken up, with preparations of the amphibian embryo for comparison. Instruction is given in methods of preparing embryological material, and of making graphic and plastic reconstructions from serial sections. *Hertwig-Marks' Embryology of Man and Mammals and Marshall's Vertebrate Embryology. Winter term, full study.* Dr. KOFOID.

Required: Zoölogy 1 or 3.

5. ADVANCED ZOÖLOGY.—To students who have had course 1, 2, or 3, an opportunity is offered for a year's work in advanced zoölogy. It may be closely adapted to the bent and ability of the student. Four main lines of work will, however, be especially provided for: (a) Systematic reading of general zoölogy (at present Hertwig's Lehrbuch der Zoölogie),

together with lectures on the history of zoölogy and on the morphology, physiology, and œcology of special groups. (b) Seminary work, consisting of the collation, indexing, and abstracting of a scattered literature on assigned or selected subjects, and the preparation of papers based on these bibliographical and literary studies. These papers will be closely criticised and discussed as a means of education in the preparation of scientific manuscript for the press. Regular instruction in natural history drawing sufficient to enable the student to prepare illustrations for reproduction by the ordinary methods will be made a part of this course. (c) Zoölogical research work, which will usually take the form of an original investigation of a limited subject, carried forward with whatever aid, guidance, and instruction, the nature of the subject and the ability of the student may require. It is the purpose of this course to make the student acquainted with the general method of science and to prepare him for the thesis investigation of the senior year. Students so desiring may pursue a research course at the University Biological Station on the Illinois River during the summer vacation months, and will receive credit therefor. (d) Pedagogical zoölogy, offered with special reference to those who wish to become teachers of biological subjects. This course will be conducted in coöperation with the department of pedagogy.

Any one of these four lines of work may be taken separately, proportional credit to be given therefor. Seminary and research courses will, however, be required of all students purposing to graduate with a zoölogical thesis. *Fall winter, and spring terms, full study*. Professor FORBES.

Required: Zoölogy 1, 2, or 3.

6. GENERAL ENTOMOLOGY.—This course of two terms should be taken by preference in the sophomore year. It is practically a sequel to course 2 in general zoölogy, the work of the second term of that course being directed especially towards entomology.

Presuming upon a general knowledge of the Arthropoda, the instruction begins with more detailed work on Insecta. The greater part of the course consists of laboratory studies of the structure and classification of insects; practice in the determination of species and the description and illustration of species and structures; field work and observation, including

the collection of specimens of all orders and stages, aquatic and terrestrial; office work in the preparation, labeling, and arrangement of collections; a systematic independent study of life histories of selected species, with full records, descriptions, and drawings; experimental insecticide work, and library practice in the collection, collation, indexing, and abstracting of the literature of the species principally studied, concluding with a thesis on a single species studied both biologically and experimentally. Special instruction is given in this course in the art of entomological illustration, under the supervision of an expert zoölogical artist.

It is intended that the student shall come through this course accomplished in all the methods of the zoölogical laboratory as applied to entomology, competent to determine, to draw, and to describe species, and experienced in the various operations of field, laboratory, library, and economic entomology. *Winter and spring terms, full study.* Professor FORBES and Mr. JOHNSON.

Required: Zoölogy 1, 2, or 5.

7. ADVANCED ENTOMOLOGY.—Special courses will be arranged in either technical or practical entomology for students wishing to specialize extensively in this direction, and to such students the facilities of the State Laboratory of Natural History and of the State Entomologist's office will be freely open. Special provision will be made for the instruction and supervision of students desiring to fit themselves for the investigation of the contagious diseases of insects. *Fall, winter, and spring terms, full study.* Professor FORBES.

Required: Zoölogy 5.

8. PRACTICAL ENTOMOLOGY.—This is a single term's work open, without conditions precedent, to University students, but offered for the special benefit of students in agriculture. By means of laboratory studies and lectures and field and insectary observations, students will be made familiar with the commonest and most important injurious insects, and with means of preventing or arresting their injuries. *Spring term, full study.* Mr. JOHNSON.

9. THESIS INVESTIGATION.—Candidates for graduation in the College of Science who select a zoölogical subject as a thesis are required to spend at least three hours a day during their senior year in making an investigation of some selected

zoölogical subject. While this work is done under the general supervision of an instructor, it is in its methods and responsibilities essentially original work. *Fall, winter, and spring terms, full study.* Professor FORBES.

Required: 2 years' major work in Zoölogical Courses, including Zoölogy 5b and 5c.

10. ELEMENTARY ZOÖLOGY.—This is a laboratory and lecture course on the morphology, physiology, and œcology of types selected from the animal kingdom. The work is so directed as to lead to an acquaintance with the simpler generalizations of biology, in preparation for the more extensive and thoroughgoing theoretical work of general biology 1. It is offered as a minor to students in the College of Science not specializing in zoölogy, and as an unconditioned elective to members of other colleges. *Fall term, full study.* Mr. FRANK SMITH.

11. ELEMENTARY ENTOMOLOGY.—This is a laboratory and lecture course in general entomology, open to all University students, pursued without especial reference to economic ends, complete in itself, but leading to the major course in entomology (zoölogy 6). It is especially commended to prospective teachers of natural science and to general students who wish a brief but thoroughgoing experience in some department of natural history. *Fall term, full study.* Mr. JOHNSON.

COURSES FOR GRADUATES

101. SYSTEMATIC AND FAUNISTIC ZOÖLOGY.—This course consists of studies of invertebrate animals (including insects), and of aquatic vertebrates, so directed as to give as nearly as possible an exhaustive knowledge of a taxonomic group or of a selected geographic assemblage. If a suitable taxonomic group is chosen, its space and number relations within a definite area will be thoroughly worked out by the precise methods of modern faunistic zoölogy, including quantitative collections made by uniform methods at regular periods, and the comparative measurement or enumeration of such collections. A study by this means of local and periodic variations in number and distribution will lay the foundations for work in the following course. If a geographic assemblage be selected, critical determinative work will be followed by both qualitative

and quantitative studies of the various groups associated, with a view to accumulating data for an examination of the interactions of the assemblage.

102. Œcological Zöology.—Parallel with or following upon the foregoing course, studies may be pursued to exhibit with precision the interactions between the individual animal, the group, or the assemblage on the one hand, and its environment on the other.. Under this head come the relations to nature sustained by birds, insects, and aquatic animals; the phenomena of contagious disease and other forms of parasitism; and the entire system of interactions exhibited by the associated living occupants of a circumscribed area. So far as the studies involve merely the generalizations of data of observation and the combination of such generalization in an œcological theory to be tested by further observation of normal phenomena, they may be regarded as belonging strictly in the present course as here defined. This course and the following are, however, so closely related that they will rarely be kept completely separate.

103. Experimental Zoölogy.—Under this head are included all experimental studies on animals, whether requiring a special apparatus or not, which are intended to solve specific problems. It will be directed mainly to problems of variation, of distribution and location, and of œcological relationship, which admit of precise solution by exact experimental methods fully under the control of the operator. The experimental equipment of the State Laboratory of Natural History and of the University Biological Station will be at the service of graduate students in this course.

104. Advanced Economic Entomology.—This is a research course in systematic and experimental entomology which involves the application to insects injurious to agriculture and horticulture of the methods and general ideas of the three preceding courses. It is intended to prepare students in a thoroughgoing manner for first-class investigation work in this field, and for the direction of entomological operations in agricultural experiment stations.

105. Pedagogical Zoölogy.—To university graduates who have taken one or more years of major work in zoölogy, an opportunity will be given for a year's additional study of that subject, pursued with strict reference to its

teaching in high schools or colleges. Those pursuing this course will be preferred, other things being equal, as student assistants in the zoölogical laboratories.

DEGREES

BACHELORS' DEGREES

The usual bachelors' degrees are conferred upon those who satisfactorily complete the courses of study described under the different colleges. A candidate for a bachelor's degree must pass in the subjects marked *prescribed* in his chosen course, and must conform to the directions given in connection with that course in regard to electives. In the Colleges of Literature and Arts, of Science, and of Agriculture, 40 term-credits are required for graduation, except in the chemical group in the College of Science, where 41 credits are required. In the College of Engineering the candidate must complete the course of study as laid down. The number of credits required includes two for military science for men, and for women may include the same number for physical culture. Men excused from the military requirements, and women who do not take courses in physical culture, must elect in lieu thereof two extra terms' work in other subjects.

In all cases in which a thesis is required,* the subject must be announced not later than the first Monday in November, and the completed thesis must be submitted to the dean of the proper college by June 1st. The work must be done under the direction of the professor in whose department the subject naturally belongs, and must be in the line of the course of study for which a degree is expected. The thesis must be presented upon regulation paper, and will be deposited in the library of the University.

1. The degree of Bachelor of Arts is given to those who complete a course in the College of Literature and Arts.

2. The degree of Bachelor of Science is given to those who complete a course in the College of Engineering, of Science, or of Agriculture. The name of the course will be inserted in the diploma after the degree.

*See pp. 220, *note*, and requirements for graduation in the different colleges.

ADVANCED DEGREES

No degrees are given for study *in absentia*, except that graduates of this University, who become members of the graduate school and reside elsewhere, may receive a second degree, upon the completion of their courses of study within not less than three years of the date of registration. For a graduate of this University who has won recognized distinction in a special line of investigation, and who otherwise fulfills the conditions for a doctor's degree, the requirements of residence for that degree will be such as may be imposed by the general faculty of the University, on presentation of the case by the council of administration. Advanced degrees are conferred by the trustees of the University only upon recommendation of the general faculty, based upon information furnished by the council of administration.

Second Degrees

The second degrees conferred by this University are as follows:

Master of Arts, after Bachelor of Arts in courses of the College of Literature and Arts.

Master of Science, after Bachelor of Science in courses of the Colleges of Agriculture and Science.

Master of Architecture, after Bachelor of Science in courses in Architecture and Architectural Engineering.

Civil Engineer, after Bachelor of Science in the course in Civil Engineering.

Electrical Engineer, after Bachelor of Science in the course in Electrical Engineering.

Mechanical Engineer, after Bachelor of Science in the course in Mechanical Engineering.

Graduates of other colleges and universities having equivalent requirements for baccalaureate degrees may be given second degrees determined in kind by comparison with the usage described above.

All candidates for second degrees are required to register in the graduate school; to conform to the conditions outlined under "Admission," "Registration," and "Studies and Examinations" [pp. 123–126]; to pursue an approved course of study for one academic year in residence, or in the case of

graduates of this University, for three years *in absentia;* and to pass satisfactory examinations upon all the studies of the approved course.

Each candidate for a second degree must present an acceptable thesis in the line of his major subject of study. The subject of this thesis must be announced to the dean of the general faculty not later than the first Monday in November of the academic year in which the course is to be completed. The completed thesis, upon regulation paper, must be presented, with the certified approval of the professor in charge, to the council of administration not later than June 1st.

The period of required study begins from the date of registration in the graduate school.

Doctor's Degree

The degree of Doctor of Philosophy may be conferred upon any member of the graduate school of not less than three years' standing who shall have reached high attainments in scholarship, including a sufficient knowledge of the Latin, French, and German languages to serve the purposes of research in his principal specialty, who shall have shown marked ability in some line of literary or scientific investigation, and shall have presented a thesis giving clear indications of such scholarship and of such power of research. At least the first two, or the last one, of the three years of study must be in residence at the University, and the entire course of study must be in accordance with the regulations of the graduate school.

The time and study required for a master's degree may be included in the three years required, but approval of a course of study for a doctor's degree must be upon the condition that the candidate is prepared through his baccalaureate work, or otherwise, to enter at once upon advanced studies in the line of his major subject, and that work on this major subject be continued through the three years.

The final examination of a candidate for the doctor's degree is conducted by a committee consisting of the head of the department under which the major subject has been pursued, as chairman, and of not less than two additional members of the general faculty of the University, appointed for the

purpose by the council of administration. This examination covers the subjects of the course approved for the degree, but is specially searching upon that on which the major work has been done. This examination occurs in the week preceding that upon which commencement day occurs.

Each candidate for a doctor's degree must announce to the dean of the general faculty a thesis subject not later than the first Monday in November of the academic year at the close of which the award of the degree is expected. A fair copy of the thesis must be submitted, with a certified approval of the committee on examinations, to the council of administration not later than the first day of June. If the thesis is approved by the Council the candidate must have it printed and must deposit not less than one hundred copies with the librarian of the University.

FELLOWSHIPS

6x400

The trustees of the University have established six fellowships, each with a stipend of four hundred dollars, payable in ten monthly instalments.

The rules governing appointments to these fellowships are as follows:

1. The purpose of these fellowships shall be to promote advanced scholarship and original research in the University.

2. The fellowships shall be open to graduates of this and similar institutions. Those who are to complete an undergraduate course previous to the academic year for which appointments are made shall be eligible, with others, as candidates.

3. Nominations to fellowships, accompanied by assignments to special departments of the University for instructional work, shall be made by the council of administration to the trustees of the University, upon applications received by the President of the University each year, not later than the twenty-fifth day of April. These nominations shall be made at a meeting of the council called for that purpose within the month of May. The appointments by the trustees shall be made at their regular meeting in June, and shall take effect the first day of the following September. Vacancies may be filled by similar nominations and appointments at other times.

4. Nominations to fellowships shall be made upon the grounds of worthiness of character, scholastic attainments, and

promise of success in the principal line of study or research to which the candidate proposes to devote himself. Consideration shall also be given to the probable value or usefulness of the services of the candidate as an assistant in instruction, but this shall not be deemed the primary object of the appointment. Other things being equal, preference shall be given to those graduates of this University who have pursued a specialized course.*

5. Candidates must present, with their applications, full information concerning themselves and their qualifications for advanced study and research work, including any written or printed essays or results of investigation, and must name the subject in which they wish to do their major work.

6. Fellowships shall be good for one year. Appointments may not be usually renewed to the same persons, and in no case for more than one additional year; but an appointment as *honorary fellow*, without stipend, may be made as specified for paid fellowships in the case of any one who has held a regular fellowship and has shown distinguished merit in his work.

7. Fellows shall be constituted members of the graduate school, shall have all of the privileges and bear all of the responsibilities of such membership. Each regular fellow may be called upon to render service in instruction throughout the year in the the department in which his major subject lies, equal to one hour daily of class instruction or to two hours daily of laboratory supervision. Such service may receive such credit as the council of administration may determine in each case. Blank forms for applications may be obtained by addressing the registrar.

SCHOLARSHIPS†

STATE

A law passed by the General Assembly of the State of Illinois at the session of 1895 provides that there shall be

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*See pp. 53, 99. All members of the Colleges of Engineering and of Agriculture and of the chemical and mathematical groups in the College of Science shall be considered as pursuing specialized courses.

†These scholarships replace the honorary scholarships and the accredited school scholarships heretofore given.

awarded annually to each county of the state one state scholarship, which shall entitle the holder thereof, who shall be a resident of the senatorial district to which he is accredited, to instruction in any or all departments of the University of Illinois for a term of four years, free from any charge for tuition or any incidental charge, unless such incidental charges shall have been made for materials used or for damages needlessly done to property of the University: *Provided*, that in counties having two or more senatorial districts there shall be awarded annually one additional schoolarship for each of said senatorial districts.

A competitive examination under the direction of the Superintendent of Public Instruction shall be held at the county courthouse in each county of the state upon the first Saturday of June in each and every year by the county superintendent of schools upon such branches of study as said Superintendent of Public Instruction and the President of said University may deem best.

Questions for such examinations shall be prepared and furnished by the President of the University to the Superintendent of Public Instruction, who shall attend to the printing and distribution thereof to the several county superintendents of schools prior to such examinations.

The law also provides that in case the scholarship in any county is not claimed by a resident of that county the Superintendent of Public Instruction may fill the same by appointing some candidate first entitled to a vacancy in some other county.

Candidates to be eligible to a state scholarship must be at least sixteen years of age, and must have been residents of their respective counties for the year preceding the examination.

A student holding a state scholarship who shall make it appear to the satisfaction of the President of the University that he requires leave of absence for the purpose of earning funds to defray his expenses while in attendance may, in the discretion of the President, be granted such a leave of absence, and may be allowed a period not exceeding six years from the commencement thereof for the completion of his course at said University.

The law contemplates that the candidate who passes this competitive examination should afterwards pass the regular

entrance examination to the University. It has been thought best to combine these examinations so that the successful candidate may be admitted to the University without further examination. To this end the examination will be held on the first Saturday in June and the Friday preceding (June 5, 6, 1896, and June 4, 5, 1897). The subjects for examination will be the same as stated under the head of "Admission by Examination," pp. 35–41.

Any person, whether a candidate for a scholarship or not, may be examined for admission to the University at these state scholarship examinations.

MILITARY

Students who have gained six term-credits in class room military instruction and six such credits in drill practice, are eligible for appointment as commissioned officers of the battalion. Those attaining this rank may have awarded them special scholarships, good for one year, and equal in value to the University term fees for the same length of time.

PRIZES

THE HAZLETON PRIZE MEDAL

Capt. W. C. Hazleton provided a medal, of beautiful and artistic design, which is to be awarded at a competitive drill to be held near the close of the year, to the best drilled student. Each competitor must have been in attendance at the University for at least sixteen weeks of the current college year; must not have had more than four unexcused absences from drill; and must present himself for competition in full uniform.

The award is made for excellence in these particulars:

1. Erectness of carriage, military appearance, and neatness.
2. Execution of the school of the soldier, without arms.
3. Manual of arms, with and without numbers.

The successful compettitor will receive a certificate setting forth the facts, and may wear the medal until the 15th day of May following, when it will be returned for the next competition.

THE HENRY H. HARRIS PRIZE IN BANKING

Henry H. Harris, Esq., of Champaign, offers a prize of one hundred dollars for the best essay on the History of State Banking in Illinois. Competition for this prize is open to all students, graduate and undergraduate, of the University of Illinois. All essays entered in competition are due and must be received by the Professor of Economics by noon of the first of May, 1896. The award will be made in accordance with conditions to be announced hereafter.

The right of not awarding the prize is reserved, if no one of the essays handed in is deemed of sufficient merit. Should the prize not be awarded in 1896, it will remain open for another competition.

IN ORATORY

The Trustees of the University appropriate the sum of one hundred dollars for prizes in oratory and debate during the year. One half of the amount is awarded in two prizes, of thirty and twenty dollars, respectively, to the two students adjudged the best debaters in an inter-class debate. This debate was held for the first time at the University on February 24th last.

The other half of the amount appropriated is awarded, also in two prizes of thirty and twenty dollars, respectively, for the two orations adjudged the best according to the following conditions: For the present the competition is open to members of the two upper classes. Competitors must deposit copies of their orations in the office of the President of the University on or before the first Monday in May. The writers of the six best orations shall deliver them in public on Tuesday evening of Commencement Week, and the prizes shall then be awarded.

INTERSCHOLASTIC ORATORICAL CONTEST.

A medal of the value of twenty dollars is offered annually by the University to the high schools of the state for the best oration delivered in a competitive contest between their representatives. This contest takes place in the spring at the time of the interscholastic athletic meet.

BENEFICIARY AID

CHICAGO CLUB LOAN FUND

The Chicago Club of the University of Illinois offers two loans of $250.00 each, payable to the beneficiary, $100.00 the first year, $75.00 the second year, $50.00 the third year, and $25.00 the fourth year. The loans are offered to residents of Cook County, Illinois, only, and are to be awarded upon competitive examination to those obtaining the highest average grades. The loans are due six years after matriculation. They bear no interest while the student is in the University, but six per cent. after graduation. The examination questions are prepared at the University and cover the same subjects as those for the honorary scholarships.

The beneficiaries of this fund also have their incidental fees, amounting to $22.50 a year, remitted by the trustees.

CLASS OF 1895 LOAN FUND

This is a fund of $250.00, established by the class of 1895 to be loaned to needy and deserving students. According to the conditions of the gift, one-fifth of the amount is to be loaned annually, and is open only to members of the freshmen class. No person may receive the benefit of the fund more than four years. The loan bears interest at the legal rate from the time the recipient leaves the University, and is due, one-half in five years, and one-half in six years after matriculation. The management of the fund is in charge of the council of administration.

SOCIETIES AND CLUBS

LITERARY SOCIETIES

The Literary Societies have from the opening of the University enjoyed its fostering care.

The Adelphic and Philomathean societies for men, and the Alethenai for women, occupy spacious halls, which the members have furnished and decorated with taste and elegance. Meetings are held Friday evenings throughout term time,

are well attended, and are maintained with interest. They furnish excellent drill in writing, speaking, and parliamentary methods.

THE CHRISTIAN ASSOCIATIONS

Both the Young Men's and Young Women's Christian Associations are active and useful organizations, and have a large membership.

Subscriptions have been made by students and graduates, amounting to $23,000.00, towards a new building for these organizations. A canvass has been started outside with the hope of raising the sum to $32,000.00. If this is successful the building will be begun at once. An excellent site has been purchased.

CLUBS AUXILIARY TO COURSES OF STUDY

Agricultural Club

This Club meets semi-monthly. It is devoted to the discussion of topics of theoretical and practical interest to students of agriculture. All students in the College of Agriculture are eligible to membership.

Architects' Club

This Club meets once in two weeks for the consideration of current topics of architectural interest and subjects connected with the study of architectural history. All students pursuing architectural studies are eligible to membership.

Civil-Engineering Club

This Club meets the second and fourth Saturday evenings of each month for the reading and discussion of papers relating to civil engineering. All students pursuing the civil engineering course may become members.

The English Club

The English Club is composed of members of the faculty, and of students who have done especially good work in English. The work of the club is confined to the study of recent writers

of fiction and poetry. The membership is limited to thirty. Meetings are held every three weeks.

French Club

Le Cercle Français embraces students who have had at least one year's work in French. The club meets once a week throughout the year. Its proceedings are conducted in French, the object being to supplement the work of the class room by the practical handling and understanding of the language.

The Latin Club

This is an organization for the purpose of promoting interest in the language and institutions of the Roman world. It meets once in two weeks.

Mechanical and Electrical Engineering Society

This club meets on the first and third Saturday evenings of each month.

All students pursuing mechanical and electrical engineering studies are eligible as members. Papers relating to subjects of interest to members are presented and discussed at each meeting.

Medical Club

The Students' Medical Club is composed of students, irrespective of courses and departments, who are preparing for medical study, or who are for any reason interested in medical subjects. Its programs consist of lectures by members of the biological faculty and by physicians, and of papers prepared by members of the Club. It meets weekly.

Musical Clubs

The University Glee Club is an organization for men, and is open to all male students who have good voices and can read music. From this organization a club of sixteen members is chosen, which gives concerts from time to time during the year. The entire Club meets once a week for rehearsal, and is under the direction of the head of the music department.

The Young Ladies' Glee Club is an organization for the young ladies of the University, and is in charge of the vocal department.

The Mandolin and Guitar Club is open to young men who play these instruments. Final membership is decided by competition, and those who become members are associated with the Glee Club in all its concerts.

The Military Band is an organization which has already attained a high degree of excellence, and one of which it is a great credit to be a member. It gives one or two concerts during the year, plays on public occasions, and furnishes the music for battalion drill of the Military department.

The University Chorus is organized with a view to arousing a musical spirit in the University, and is free to all students. It meets once a week for rehearsal of songs and choruses from the oratorios.

Zoölogical Club

The University Zoölogical Club is composed of advanced students and instructors in the zoölogical and physiological departments, together with such other biological instructors and advanced students as are interested in its subjects. Its sessions are devoted to the presentation and discussion of abstracts of recent biological literature and of the results of investigation by the members of the club. It meets weekly in Natural History Hall.

SPECIAL ADVANTAGES FOR WOMEN

HOUSEHOLD ECONOMICS

No course of study is specifically outlined in household economics, but there are certain courses offered regularly, a combination of which affords the student a fair training in some branches of the subject. Such credit is given in each course as the work done justifies. The following courses may be mentioned :

1. Bacteriology (Botany 2). Those who take this course under household economics will devote their time to problems which come specifically within the range of household economy; fermentation in bread making and other cooking processes, will receive special attention. Those who take the course must have had elementary botany or a course in zoölogy.

2. Chemistry of foodstuffs (Chem. 5c and 18). This course is devoted to the analysis of foodstuffs, the sanitary examination of air, tests for adulteration, etc. The chemical changes in the various processes of cooking will also be studied. At least one year's study of chemistry (3 credits) is necessary to take the course with success.

3. Physiology. This is the first term's work in advanced physiology (Physiology 2). It treats especially of the physiology of digestion, the digestibility of various foods, and proper methods of cooking with reference to digestibility.

In addition to this course, there is a course of lectures on such subjects as ventilation, contagious diseases and their treatment, which is of high practical value (see Physical Culture 2).

4. Household decoration. The subject of art in the home is one of far reaching importance; exceptional opportunities for its study are offered in the departments of Art and Design and of Architecture. The course in the "Esthetics of Architecture" (Arch. 18) is devoted in part to the subject of decoration in the home.

5. Designing of residences. This is part of the regular course in Architectural Designing (Arch. 15). Young women are permitted to attend the lectures and to do the text-book work and receive credit therefor, but are not required to make the working drawings.

THE FINE ARTS

Drawing and Painting

Four years' work is offered in drawing, modeling, and painting. The student has large opportunity to specialize, either in pencil, crayon, pen and ink, or in oil or water-colors. A detailed description of the courses is given on pages 142-3. Students may enter for the study of art alone.

Music

Full courses in vocal and instrumental music, including piano and organ, are offered. As in the case of drawing and painting, students may pursue the study of music by itself.

Physical Culture

A special gymnasium is set apart for the young women, and physical culture, under a competent instructor, is a part of the regularly accredited work of the University.

Careful attention is given to the correction of physical defects, to the promotion of good health, and to the development of a graceful carriage. In connection with the physical exercise, a course of lectures is provided, devoted especially to the proper care of health and the treatment of the more common bodily ailments.

SOCIAL ADVANTAGES

Educational training in the conventionalities is provided for in a practical way by the numerous social gatherings offered especially for the young women of the University by the wives of members of the faculty and by the lady members of the same.

ACCREDITED HIGH SCHOOLS

Accredited high schools are schools whose graduates may be admitted without examination to any course in the University for which their high school studies have prepared them. If so requested, a member of the faculty will inspect a school as to its facilities for teaching, its course and methods of instruction, and the general proficiency shown. The University bears the expense of this inspection. If the result of the investigation is favorable, a certificate of that fact is forwarded, and the name of the school is entered in the published list of accredited high schools. Annual reports are asked of these schools, and a reëxamination will be made whenever it may be deemed necessary. The following is the wording of the certificate referred to above:

This is to certify that Pupils graduating from the ....High School during the Life of this Certificate may enter the Colleges of...........................of the University of Illinois without Examination.

This Certificate is valid until................................ provided the Teaching Force and the Course of Study remain unchanged or material changes therein are approved by the University.

Given by order of the Faculty of the University at Urbana, Illinois, this......of......................

....	....
Registrar.	President.

List of Accredited Schools

ACCREDITED FOR THE COLLEGES OF LITERATURE AND ARTS, ENGINEERING, SCIENCE, AND AGRICULTURE

School	Superintendent	Principal
Alton	R. A. Haight	G. E. Wilkinson
Arcola	G. W. Smith	Lucile Brown

School	Superintendent	Principal
Atlanta	T. H. Haney	Hattie M. Montgomery
Aurora—East	J. H. Freeman	Wm. J. Pringle
" —West	A. V. Greenman	Katherine Reynolds
" —Jennings Seminary		Rev. A. R. Cronce, President
Austin	N. D. Gilbert	B. F. Buck
Beardstown	G. W. Powell	Maude Tabor
Belvidere—North	H. A. Warren	Flora Fellows
Bloomington	E. M. Van Petten	F. B. Spaulding
Cairo	T. C. Clendenen	John Snyder
Camp Point	H. W. Bowersmith	Helen M. Grubb
Carthage	W. K. Hill	W. K. Hill
Canton	C. M. Bardwell	C. S. Aldrich
Carrolton	Clyde Stone	Lottie Weber
Centralia	Irwin F. Mather	Merton D. Cox
Charleston	W. T. Gooden	Wm. Wallis
Chicago—		
Calumet	Albert G. Lane	A. S. Hall
Englewood	"	J. E. Armstrong
Hyde Park	"	C. W. French
Jefferson	"	C. A. Cook
Lake	"	E. F. Stearns
Lake View	"	Jas. H. Norton
Marshall	"	L. J. Block
Medill	"	S. B. Sabin
North Division	"	O. S. Wescott
Northwest Div.	"	Franklin P. Fisk
South Division	"	Jeremiah Slocum
South Chicago	"	Chas. I. Parker
West Division	"	G. M. Clayberg
Clinton, Ia.	O. P. Bostwick	W. J. Greenwood
Danville	Joseph Carter	S. A. D. Harry
Davenport, Ia.	J. B. Young	H. H. Roberts
Decatur	E. A. Gastman	J. J. Sheppard
Delavan	F. L. Calkins	Stella Hoghton
Dundee	S. M. Abbot	Julia M. Gay
DuQuoin	J. E. Wooters	D. B. Rawlins
Elgin	Eugene A. Mead	Walter F. Lewis
Elmwood	L. E. Flanegin	Jeanette C. Munson
Evanston	(Township High School)	H. L. Boltwood
Farmer City	C. C. Covey	C. C. Covey

School	Superintendent	Principal
Freeport	R. S. Page	J. E. McGilvery
Galena	Ira C. Baker	F. G. Muttun
Galesburg	W. L. Steele	Frank D. Thomson
Galva	F. U. White	Hedwig Maul
Geneseo	M. F. Miller	Ada M. Schnabele
Harvey	F. L. Miller	J. E. Cable
Hillsboro	Josiah Bixler	Mattie Hunt
Jacksonville	David T. Harris	Virginia Graves
Jerseyville	J. Pike	Edward B. Shafer
Joliet	W. H. Campbell	J. Stanley Brown
Kankakee	F. N. Tracy	Eugene C. Croby
Keokuk, Ia.	O. W. Meyer	G. E. Marshall
Kewanee	A. C. Butler	H. S. Latham
La Grange	(Township High School)	E. G. Cooley
Lincoln	C. W. Harriman	Jane Kidd
Litchfield	J. E. Bryan	Thos. R. Amlie
Macomb	R. C. Rennick	J. S. Griffin
Mattoon	B. F. Armitage	E. Kate Carman
Maywood	J. Porter Adams	J. E. McKean
Mendota—West	S. E. Beede	Myra J. Howes
Moline	H. M. Slauson	F. A. Manny
Monmouth	James C. Burns	W. D. McDowell
Morrison	W. A. Pratt	P. F. Burtch
Nashville	J. B. Bundy	J. W. Emmerson
Oak Park	W. H. Hatch	D. O. Barto
Olney	O. J. Bainum	Theodore Harley
Ottawa	(Township High School)	J. O. Leslie
Paris	W. W. Black	C. S. Hoover
Pekin	J. A. Hornberger	Josephine Goodheart
Peoria	N. C. Dougherty	A. W. Beasley
Pittsfield	W. B. Davis	Minna Worthington
Pontiac	(Township High School)	J. E. Bangs
Princeton	(Township High School)	R. A. Metcalf
Quincy	T. W. Macfall	Wm. F. Geiger
Rockford	P. R. Walker	B. D. Parker
Rock Island	James Ament	Walter N. Halsey
Roodhouse	P. M. Silloway	P. A. Boulton
Shelbyville	F. D. Jordan	T. A. Hillyer
Springfield	J. H. Collins	Wm. Helmle
Sterling—3d Dis't	H. L. Chaplin	Anna Parmelee

School	Superintendent	Principal
Streator	(Township High School)	J. W. Coultas
Taylorville	(Township High School)	W. E. Andrews
Tuscola	A. G. Owens	Chas. S. Earle
Upper Alton (Western Military Academy)		
	Col. Willis Brown	Albert M. Jackson
Virden	F. E. Kennedy	A. E. Evington
Waukegan	Frank H. Hall	Emily M. Coon
Wheaton	J. B. Russell	H. O. Staufft

Accredited for the Colleges of Engineering, Science, and Agriculture

School	Superintendent	Principal
Aledo	P. J. Kuntz	Mabel Pepper
Augusta	H. M. Anderson	J. G. Moore
Batavia—West	E. M. Harris	Alice Downing
Belleville	H. D. Updike	H. W. Brua
Bement	Chas. McIntosh	W. N. Tobie
Champaign	C. A. Bowsher	Lottie Switzer
Chicago—Manual Training, H. H. Belfield, Director		
English High and Manual Training, A. R. Robinson		
DeKalb	John T. Bowles	Lucy H. Carson
Dixon—North	E. C. Smith	Lawrence De Graff
" —South	Wm. Jenkins	Mary S. Porteous
East St. Louis	J. F. McCullough	Chas. L. Manners
El Paso	Anna E. Hill	Rose M. Hayden
Effingham	I. A. Smothers	G. E. Marker
Flora	J. L. Hughes	E. A. Miner
Gibson City	J. D. Shoop	R. G. Jones
Griggsville	H. C. McCarrel	Jennie Chrysuf
Harvard	Chas. W. Groves	Anna M. Morrow
Henry	W. S. Wallace	Gertrude Hull
Lacon	J. M. Frost	Grace E. Germain
Lewistown	Burton E. Nelson	Hattie M. Wasmuth
Lexington	J. B. Nichols	J. B. Nichols
LeRoy	B. F. Templeton	Getty Van Buskirk
Lyons, Ia.	J. H. Breese	Clara Bramber
Marengo	C. W. Hart	Annie M. Andrus
Mason City	C. O. Du Bois	T. B. Denham
Monticello	E. A. Fritter	T. C. Frye
Oregon	W. J. Sutherland	Antoinette E. Latson

School	Superintendent	Principal
Paxton	J. M. Robinson	W. K. Yeakel
Peru	W. W. Wirt	L. Morgan
Polo	I. M. Bridgman	Alice F. Bridgman
Rochelle	C. F. Philbrook	Minnie G. Steele
Rossville	J. S. Ragsdale	C. M. Boord
Savanna	B. F. Hendricks	Jennie Wright
Sparta	S. B. Hood	J. M. Nickles
Sterling—Wallace	S. B. Hursh	Mary D. Stuart
Sullivan	H. E. Kelly	Ella Lowe
Sycamore	A. J. Blanchard	Sarah E. Robinson
Vienna	M. N. McCartney	Ada V. McCall
Virginia	C. V. McReynolds	Lydia G. Clark
Warren	W. C. Smith	O. M. Buser
Washington	H. W. Veach	Anna M. Briggs
Wilmington	J. J. Eckman	Helen J. Buss
Winchester	W. A. Bowman	Hattie Hulick
Woodstock	L. B. Easton	Mary Richards
Wyoming	J. M. Hutchinson	Emma Lee
Yorkville	Richard Heywood	Mabel W. Barrett

MILITARY SCIENCE

The military instruction is under the charge of a graduate of the U. S. Military Academy, and officer of the regular army of the United States. The course as a whole has special reference to the duties of officers of the line. A full supply of arms and ammunition is furnished by the War Department, including 300 cadet rifles and accoutrements, and two field pieces of artillery.

Every male student, able to perform military duty, and not excused for sufficient cause, is required to drill twice each week until he has gained six creditable term-records. He is also required to study Drill Regulations for Infantry and to recite upon the same once a week until he passes two creditable term-examinations. This practical instruction begins as soon as possible after he enters the University; but a preparatory student carrying no freshman studies and not expecting to matriculate during the year, is not permitted to drill. The standings in study and drill are placed on record, with other class credits; two terms of recitations and drill count one credit, and the four

remaining terms of drill another, and are requisite to graduation in every University course.

Appointments in the battalion are made on nomination by the professor in charge and confirmation by the faculty.

Students who have passed two examinations in the drill regulations and who have gained two term-credits in drill practice are eligible for corporals; those having three term credits in each are eligible for sergeants; and those having six term-credits in each, for lieutenants and for officers of higher rank.

The battalion (six companies) is composed mainly of the members of the freshman and sophomore classes, the first supplying the corporals, the second, the sergeants, while the captains and lieutenants are taken from those of the junior and senior classes who have passed through the lower grades satisfactorily.

A special military scholarship, good for one year, is open to each student who attains the grade of a commissioned officer, the value of which is paid the holder at the close of the year.

An artillery detachment is organized mainly from the second year, or sophomore, class, which receives practical instruction twice each week during the college year.

Towards the close of the spring term, a committee appointed by the faculty examines candidates for nomination to the governor of the state to receive commissions as brevet captains in the state militia. Candidates must be members of the senior class in full standing at the time of this examination; must have completed the course of military studies; must have served three terms as captains or lieutenants, and must be approved by the faculty as having good reputations as scholars, officers, and gentlemen.

Under the authority of the acts of corporation, the trustees have prescribed a uniform of cadet gray, coat trimmed with black mohair braid, trousers with black cloth stripe, cut after the U. S. army pattern. The uniform of the cadet officers is of dark blue cloth for coat and light blue for trousers; cap for all of dark blue cloth, army pattern, with university badge embroidered thereon in gold bullion; white gloves; the uniform of the band dark blue throughout, with special trimmings.

The University Cornet Band is composed of students, and every full term of service therein is counted as one term of drill.

PHYSICAL TRAINING

The object of the Department of Physical Training is to teach and to put into practice the best methods of preserving health, of gaining physical vigor, of correcting imperfect development, and of avoiding injury and disease. Careful physical examinations are made and special exercises are prescribed to suit individual cases. Special attention is given to those who do not reach the normal in strength or in harmonious bodily development. The records of successive measurements and examinations show what results have been gained. Certificates of the proper examiner are required for membership in the athletic teams. Credits towards graduation are given for the completion of the work described in the description of courses.

Incidentally the department furnishes recreation to the students of the University and makes a way for proper and helpful amusements.

Men and women have their practice and much of their instruction separately in physical training, but all students have equal consideration in the provisions made for the work and in the freedom of choice under the necessary regulations. For both sexes the subjects are taught and the work is directed so as to secure, as largely as possible, all of the benefits, and, at the same time, to avoid the evils connected therewith. The director is a regular member of the faculty; experienced instructors and coaches are employed; the practical work indoors and outdoors is under close supervision. The director of the women's work is an accomplished woman, as well as a thoroughly trained teacher.

The facilities for this work are excellent. The gymnasium for men—Military Hall—has a floor space of 100x150 feet, affording free room for developing apparatus, ball courts, running track, dressing rooms and baths. The adjoining "Illinois Field" serves admirably well for games and for track purposes, and here take place intercollegiate contests, under favorable conditions, in football, baseball, track athletics, and tennis.

The women's gymnasium—in Natural History Hall—occupies very attractive quarters, and is well equipped. The pastime grounds nearby, in use through the year, when the weather permits, have a sixteen-lap running track, eight

tennis courts, two basket ball fields, and space for hurdling, handball, and other suitable amusements.

GENERAL INFORMATION

GENERAL LECTURE COURSE

The following lectures, primarily for the students, were given at the University during the year:

By Professor I. O. Baker:
- October 8, The Distance to the Stars.

By Professor E. W. Bemis, of Chicago:
- October 14, The Labor Movement in England.
- October 15, The Labor Movement in America.
- October 16, Problems in Monopoly.
- October 17, The Demand for More Money.

By Professor C. M. Moss:
- October 22, Some Phases of Athenian Legislation.

By Mrs. Helen Campbell, of Chicago:
- November 4, The Statics and Dynamics of Household Economy.
- November 5, The House.
- November 6, Organism of the House.
- November 7, Decoration.
- November 11, Furnishing.
- November 12, Nutrition.
- November 13, Food and its Preparation.
- November 14, Service.

By Isham Randolph, of Chicago:
- November 25, The Chicago Drainage Canal.

By Miss Mathilde Wergeland, of Chicago:
- December 2, Assyrian and Egyptian Art: *Symbolism;* Early Greek Art.
- December 3, Greek and Roman Art: *Idealism.*
- December 4, Art During the Middle Ages: *Spiritualism;* Renaissance: *Dawn of Realism.*
- December 5, Renaissance and Modern Art.

By Professor Burt G. Wilder, of Ithaca, N. Y.:
- January 7 and 8, The Brains of Men and Apes; Their Resemblances and Differences.

By Lorado Taft, of Chicago:
January 14, The Great Masters of the Sixteenth and Seventeenth Centuries.
January 15, Contemporaneous Art, as Illustrated in the Gallery of the Luxembourg (Paris).

By Hon. John G. Hill, of Cincinnati:
January 21, Water Supplies for Cities.

By Professor C. Lloyd-Morgan, of Bristol, England:
February 3 and 4, Habit and Instinct; a Study in Heredity.

By Dwight C. Morgan, of Dwight, Illinois:
March 9, Railroad Crossings on the Same Level, and Their Protection by Interlocking and Signal Appliances.

CONCERTS AND RECITALS DURING THE YEAR

By Professor Walter Howe Jones:
October 1, 1895, Chopin Recital.

By Miss Elinor Edwina Ellsworth:
October 29, 1895, Song Recital.

By Glee and Mandolin Clubs:
December 6, 1895, Concert.

By Mme. Fannie Bloomfield-Zeisler:
December 9, 1895, Piano Recital.

By Miss Adeline Whitney Rowley:
January 28, 1896, Song Recital.

By the University Military Band:
February 14, 1896, Concert.

By Mr. Max Bendix and Mr. F. W. Carberry:
March 3, 1896, Violin and Vocal Recital.

By the Chicago Orchestra, Mr. Theodore Thomas, Conductor:
April 20, 1896, Concert.

EXPENSES

Board

The University does not furnish board, but there is a large number of suitable private places in Urbana and Champaign, within walking distance of the University, and easily accessible by electric railway, where students can obtain table board and rooms. There are several students' clubs at which the cost of meals is about two and a half dollars a week.

The Business Agent and the Young Men's and Young Women's Christian Associations of the University will aid new students in procuring rooms and boarding places.

Fees

The Tuition is Free in all the University classes for matriculated students.

The Matriculation Fee entitles the student to membership in the University until he completes his studies, and is	$10 00
The Diploma Fee, payable before graduation, is	5 00
The Term Fee, for incidental expenses, is, for each student, except in Graduate School	7 50
The Tuition Fee, for all special students (except in music), and for pupils of the Preparatory School, per term, is	5 00

Music Fees.—Students enrolled in the department of music only, pay no matriculation fee or term fee. They must, however, pay the following music fees :

	FIRST TERM	SECOND TERM	THIRD TERM
Piano, Organ, or Voice (Two lessons a week.)	$25 00	$20 00	$20 00
Piano, Organ, or Voice (One lesson a week.)	15 00	12 00	12 00

Harmony, counterpoint, fugue, etc., in classes not to exceed four, $10 00 per term.

Students enrolled in any one of the colleges, who have paid the fees therein, may enter the department of music on payment of the following fees:

	FIRST TERM	SECOND TERM	THIRD TERM
Piano, Organ, or Voice......... (Two lessons a week.)	$20 00	$15 00	$15 00
Piano, Organ, or Voice......... (One lesson a week.)	12 00	9 00	9 00

No deduction is made on account of absence in either course, except in case of protracted illness.

Students can rent pianos for practice by applying to the head of the music department.

LABORATORY FEES.—Each student working in laboratories, or in the draughting or engineering classes, is required to make a deposit varying from 50 cents to $10, to pay for chemicals and apparatus used, and for any breakages or damages.

ALL BILLS due the University *must be paid within ten days after the student enters classes.*

NECESSARY EXPENSES

The following are estimated minimum and maximum annual expenses, exclusive of books, clothing, railroad fare, laboratory fees, if any, and small miscellaneous needs:

Term fees..	$22 50	$ 22 50
Room rent for each student (two in a room)......	22 50	50 00
Table board in boarding houses and clubs........	90 00	126 00
Fuel and light...................................	10 00	15 00
Washing..	12 00	18 00
Total..	$157 00	$231 50
Board and room in private houses, per week.....	4 00	6 00

CAUTION TO PARENTS—STUDENTS' FUNDS

The Business Agent will receive on deposit any funds parents may intrust to him to meet the expenses of their sons and daughters. *No greater error can be commited than to send young people from home with large amounts of spending money*, without the authoritative care of some prudent friend. Half the dissipation in colleges springs from excessive allowances of money. Students have little real need for money beyond that required for fees, board bills, and books. The attention of parents and guardians to this matter is earnestly requested, especially in the case of those students who are under age.

PREPARATORY SCHOOL

INSTRUCTORS

EDWARD G. HOWE, *Principal*, Natural Science.
HERMAN S PIATT, A.M., French.
NATHAN A. WESTON, B.L., History and Geometry.
RALPH P. SMITH, Ph.B., German.
LILLIE ADELLE CLENDENIN, English.
CHARLES N. COLE, A.B., Latin and Greek.
REUBEN S DOUGLASS, A.B., Algebra.
GEORGE D. HUBBARD, Science.

This school has an efficient corps of instructors and ample equipment for thorough work along those lines which will best prepare the student for the University. The school offers special advantages to young men and women who, on account of advanced age or prolonged absence from school, are out of touch with the high school.

ADMISSION

Candidates for admission must be at least fifteen years of age, and must pass satisfactory examinations in the following subjects:

1. ARITHMETIC.—A thorough knowledge is required of fundamental operations, simple and denominate numbers, the metric system of weights and measures, common and decimal fractions, practical measurements, percentage, ratio and proportion.

2. ENGLISH.—The examination is intended to test the student's vocabulary and his knowledge of grammar.

3. GEOGRAPHY.—An accurate knowledge of elementary physical and political geography is required.

4. HISTORY.—As a foundation in this subject, a knowledge of the early settlement of North America and of the growth and development of the United States, is required. A knowledge of the nature and operation of the forces active in

American life is desired, rather than the memorization of isolated dates and names.

Entrance should be made at the opening of the term. Examinations are held in the rooms of the school. For the fall term, 1896, these examinations occur on Thursday, Friday, and Saturday, the 3d, 4th, and 5th of September; for the winter and spring terms, on the two days previous to the opening of each term. Examinations on these dates are free, but for examinations at other times a fee of three dollars is charged.

Examinations may be conducted in Illinois by county superintendents of schools in the same manner as for teachers' certificates, and their favorable reports will be accepted for entrance. First or second grade teachers' certificates from superintendents of Illinois will be taken for the same purpose, as will also certificates of the accomplishment of not less than one full year's work in a high school accredited by the University.

COURSE OF STUDY

The time necessary for the completion of the course offered is not fixed, but depends on the ability and previous training of the student. Applicants will be admitted at any time on presenting proof that they are prepared to pursue the selected subjects. Preparatory students generally carry four studies, one of which should be such as needs but little work outside of the class room. The number varies, however with the ability of the student and the nature of the course.

SUBJECTS OFFERED*

Fall Term	*Winter Term*	*Spring Term*
Drawing	Drawing	Drawing
History	Drawing	Drawing
	Language	
English	English	English
French	French	French
Greek	Greek	Greek
German	German	German
Latin	Latin	Latin

* Details of work can be found in the alphabetically arranged plan of instruction below.

	Mathematics	
Algebra	Algebra	Algebra
Geometry	Geometry	Geometry
	Science	
Physiology	Zoölogy	Botany
	Physics	Physics

Students must choose from the above list such studies as they require for their chosen courses in the University, taking those under each head in the order given, except the optional languages and sciences.

COURSES OF INSTRUCTION

ALGEBRA

Rapidity and accuracy in all operations is rigidly required. Special emphasis is laid upon the use of purely literal expressions, radicals, fractional and negative exponents, and upon the fundamental nature of equation.

By terms, the work is divided as follows:

1. Fundamental processes, factoring, divisors, and multiples, fractions, and simple equations with one or more unknown quantities.
2. Involution and evolution, theory of exponents, radicals, and quadratic equations.
3. Theory of quadratic equations, inequalities, theory of limits, ratio and proportion, variation and the progressions.

One class will review the entire subject in the fall term. If *five or more apply*, a beginning class will be formed in January.

BOTANY

This is a study of plants rather than of books about plants, although books are not disregarded. It is an introduction to the science, and is intended to give an acquaintance with the chief features of the subject. The analysis of simple flowers and the preparation of a small herbarium of correctly named and properly mounted plants is required.

ENGLISH

The subject is presented in such a way as to increase the student's vocabulary and to develop elegance and exactness of of expression in his composition. Advanced grammar and rhetoric are taught in connection with this work. The study of literary masterpieces is also pursued to furnish material for the weekly written exercises, and to cultivate a taste for good literature. Considerable collateral reading in English and American authors is therefore required.

The work, by terms, is as follows:

First Year

1. Review of Whitney's Grammar. Composition. Critical study of English and American Masterpieces.
2. Genung's Outlines of Rhetoric. Composition. Critical study of English and American Masterpieces.
3. Genung's Outlines of Rhetoric completed. Composition. Critical study of English and American Masterpieces.

Second Year

All three terms.—A general survey of American Literature. Theme writing. Critical study of English and American Masterpieces.

A course of outside reading runs through the two years.

FREE-HAND DRAWING

This subject is best taken in the first term in order that pupils may have the benefit of its training in the studies which follow. *Frederick's Notes on Free-Hand Drawing.*

FRENCH AND GERMAN

Students in the Preparatory Department take the first year's work of the regular University German and French classes. The *Joynes-Meissner German Grammar* and *Van Daell's Beginning French*, together with short stories and sketches of varying difficulty, form the basis of the work.

GEOMETRY

Special attention is paid to the development of the idea of mathematical demonstration; and, as many students who can

reason logically cannot express their ideas clearly, due attention is paid to correctness of form. As soon as the student has attained the art of rigorous demonstration, he is required to produce constructions and demonstrations for himself. Considerable attention is devoted to original work.

The work, by terms, is as follows:

1. All of Plane or Solid* Geometry.
2. Both Plane* and Solid Geometry.
3. Solid Geometry.

GREEK

The study of this subject should, when possible, be preceded by at least one year of Latin.

The work, by terms, is arranged as follows:

FIRST YEAR

1. Goodwin's Greek Grammar with Preparatory Greek Book.
2. Goodwin's Greek Grammar, and Moss's First Greek Reader.
3. The Grammar and Xenophon's Anabasis with Greek prose composition.

SECOND YEAR

1. Continuation of third term's work.
2. The Grammar and selections from Xenophon's Hellenica with prose composition based on the text read.
3. The Grammar and selections from Herodotus with prose composition based on the text read.

The authors named in the last four terms will not be insisted upon in the case of those offering Greek for entrance. An equivalent amount from any other authors will be accepted. Ability to read at sight passages of average difficulty will be deemed of major importance.

HISTORY

Instruction in this subject is confined to English and American history. A detailed study of the rise and progress

* If five or more apply.

of the English-speaking people in England and America is made, and considerable attention is given to the origin and development of representative government. The work extends through one year; one-half of the time is devoted to English, and the other half to American, history.

The work, by terms, is as follows:

1. English History through the Revolution of 1688.
2. English History from 1688 to the present time, and American History to the Revolutionary War.
3. American History from the Revolutionary War to the present time.

LATIN

The ground covered consists of the grammar and selections from Caesar, Sallust, Cicero, and Vergil. Translation of English into Latin is made a prominent part of the work, and in connection with the Vergil the scansion of hexameter verse and matters of historical and mythological interest are studied. The Roman method of pronounciation is used, with special attention to quantity. *Allen and Greenough's Grammar, and Collar's Prose Composition.*

By years, the work is as follows:

FIRST YEAR

Preparatory Latin Book, Viri Romae, Arrowsmith and Whicher's Latin Readings.

SECOND YEAR

Caesar, Sallust, Cicero.

THIRD YEAR

Cicero, Vergil.

PHYSICS

This study is so presented as to cultivate habits of careful observation, and to develop in the student the ability to reach general conclusions inductively by means of exact experiment. In all laboratory work the student is required to keep a notebook containing a complete record of experiments performed. The work is begun in the winter term.

PHYSIOLOGY

This is the first science studied because it is one in which the student should be early informed, and because it also serves as an introduction to the study of zoölogy.

Charts, a skeleton, a manikin, and illustrative material from the lower animals are used.

ZOÖLOGY

This study logically follows Physiology. Through the study of typical animals the subject is so presented as to lead the student to a knowledge of methods of scientific classification in the natural sciences.

REGULATIONS

Reports regarding all non-resident and minor students (and, upon request, regarding any others) are sent to parents or guardians as soon as students are settled in their work, and reports regarding all students are sent at the close of each term.

The calendar of the Preparatory School is the same as that of the University.

For information concerning fees and expenses, see page 239.

For special information with regard to the Preparatory School, address Edward G. Howe, Urbana, Illinois.

LIST OF STUDENTS

GRADUATE SCHOOL

Burnham, Alton Cyril, B.S., Michigan Agricultural Coll.,	*Urbana,*	Mechanical Eng'g.
Busey, Frank Lyman, B.S., Univ. of Ill.,	*Urbana.*	Mechanical Eng'g.
Capps, Earl Vanhise, B.S., Univ. of Ill.,	*Mt. Pulaski,*	Electrical Eng'g.
Chipman, Paul, B.S., Univ. of Ill.,	*Champaign,*	Civil Engineering.
Cole, Charles Nelson, A.B., Ill. Wesleyan Univ.,	*Champaign,*	Philosophy.
Foote, Ferdinand John, B.S., Univ. of Ill.,	*Champaign,*	Electrical Eng'g.
Fraser, Wilber John, B.S., Univ. of Ill.,	*Champaign,*	Agriculture.
Goodenough, George Alfred, B.S., Michigan Agricultural Coll.,	*Champaign,*	Mechanical Eng'g.
Hempel, Adolph, B.S., Univ. of Ill.,	*Urbana,*	Natural Science.
Hood, Laura S A.B., Indiana State Univ.,	*Dublin, Ind.,*	Mathematics.
King, Francis Edward, B.S., Univ. of Ill.,	*White Hall,*	Pedagogy.
Meneely, John Henry, A.B., Austin Coll.,	*Kinmundy,*	Eng. and Mod. Lang.
Pillsbury, Bertha Marion, A.B., Univ. of Ill.,	*Urbana,*	Classical.
Richart, Frederick William, B.S., Univ. of Ill.,	*Carbondale,*	Mechanical Eng'g.
Scott, Daisy Coffin, B.L., Univ. of Ill.,	*Champaign,*	Latin.
Sharpe, Richard W, B.S., Univ. of Ill.,	*Tiskilwa,*	Natural Science.

Sparks, Marion Emeline, A.B., Univ. of Ill.,	*Urbana,*	Classical.
Thompson, Marion, B.L., Univ. of Ill.,	*Bement,*	Eng. and Mod. Lang.
Weston, Nathan Austin, B.L., Univ. of Ill.,	*Champaign,*	Economics and Hist.
Wilder, Charles Thornton, B.S., Univ. of Ill.,	*Champaign,*	Natural Science.

RESIDENT GRADUATES

Boggs, Cassandra Armstrong, B.L., Univ. of Ill.,	*Urbana,*	Physical Culture.
Call, Hortense, B.S., Univ. of Ill.,	*Urbana,*	Natural Science.
Jones, Isabel Eliza, Univ. of Ill.,	*Champaign,*	Art and Design.
Moore, Grace Lillian, B.S., Univ. of Ill.,	*Tolono,*	Natural Science.
Perry, Joseph Albert, U. S. Naval Academy,	*Cornell,*	Civil Engineering.
Seibert, Emma Effie, B.S., Univ. of Ill.,	*Riverdale,*	Art and Design.
Stewart, Mabel, B.S., Univ. of Ill.,	*Champaign,*	Physical Culture.
Weston, Margaret, B.L., Univ. of Ill.,	*Champaign,*	Eng. and Mod. Lang.

SENIORS

Adams, Edward Langford,	*Austin,*	Electrical Eng'g.
Alpiner, Amelia Darling,	*Kankakee,*	Eng. and Mod. Lang.
Bailey, Leonard Lionel,	*Chicago,*	Architectural Eng'g.
Beach, James George,	*Apalachin, N. Y.,*	Arch. Eng'g.
Begole, Joshua Franklin,	*O'Fallon,*	Mechanical Eng'g.
Bennett, Georgia E,	*Milford Center, O.,*	Chemistry.
Besore, Nellie,	*Urbana,*	Latin.
Blakeslee, James Woodbury,	*Kinmundy,*	Eng. and Mod. Lang.
Boyd, George Eugene,	*Roseville,*	Civil Engineering.
Brenke, William Charles,	*Chicago,*	Chemistry.
Brower, Ralph Plumb,	*Champaign,*	Civil Engineering.
Buck, Luella Eugenia,	*Philo,*	Natural Science.

Burt, Henry Jackson,	*Urbana,*	Civil Engineering.
Cairns, Cora Mae,	*Polo,*	Eng. and Mod. Lang.
Campbell, Walter Gilbert,	*Champaign,*	Electrical Eng'g.
Carnahan, David Hobart,	*Champaign,*	Latin.
Chatten, Melville Clarke,	*Quincy,*	Architecture.
Clarke, Florence Besançon,	*Quincy,*	Chemistry.
Cole, Mary Maude,	*Rantoul,*	Latin.
Cooper, Paul Henry,	*Mendota,*	Electrical Eng'g.
Durstine, Warren Edward,	*Rock Falls,*	Electrical Eng'g.
Estee, Henry Clarence,	*East Lynn,*	Civil Engineering.
Everett, Frank Milton,	*Quincy,*	Electrical Eng'g.
Folger, Rachel Ellen,	*Ridge Farm,*	Natural Science.
Forbes, Bertha Van Hoesen,	*Urbana,*	Natural Science.
Gamble, Samuel Wesley,	*Chicago,*	Architectural Eng'g.
Garnett, Charles Hunter,	*St. Mary's*	Latin.
Gazzolo, Frank Henry Serafino,	*Chicago,*	Chemistry.
Graham, Hugh Peter,	*Illiopolis,*	Civil Engineering.
Green, Frank Hopkins,	*Ivesdale,*	Mechanical Eng'g.
Green, Herbert John,	*Kewanee,*	Architecture.
Haskell, Howard Hall,	*Mendota,*	Electrical Eng'g.
Hindman, John J,	*Champaign,*	Eng. and Mod. Lang.
Honens, Fred William,	*Milan,*	Civil Engineering.
Hottes, Henry Gustav,	*Mascoutah,*	Architecture.
Hubbard, George David,	*Urbana,*	Natural Science.
Huston, Fred Thales,	*Blandinsville,*	Natural Science.
Jobst, George J,	*Peoria,*	Architectural Eng'g.
Johnson, Lewis William,	*Champaign,*	Philosophy.
Kent, Louis Maxwell,	*Danville,*	Eng. and Mod. Lang.
Ketchum, Robert Bird,	*La Prairie,*	Civil Engineering.
Kiler, Aureka Belle,	*Urbana,*	Eng. and Mod. Lang.
Leal, Sophie,	*Urbana,*	Latin.
Lewis, Charles Milton,	*Blue Mound,*	Architecture.
Liese, George Charles,	*Nashville,*	Architecture.
Linn, Homer Roberts,	*Byron,*	Mechanical Eng'g.
Ludwick, George Washington,	*Champaign,*	Architecture.
McKee, James Harry,	*Chicago,*	Mechanical Eng'g.
McRae, John Alexander,	*Kewanee,*	Mechanical Eng'g.
Manard, Robert Payton,	*Rockford,*	Architecture.
Marble, Harry Curtiss,	*Champaign,*	Electrical Eng'g.
Martin, John Madison,	*Urbana,*	Eng. and Mod. Lang.
Mason, William Charles,	*Ripon, Wis.,*	Architecture.

Mather, Althea S,	*Joliet,*	Eng. and Mod. Lang.
Maxwell, Charles Jacob,	*Champaign,*	Chemistry.
Millar, Adam Vause,	*Mattoon,*	Mathematics.
Milne, Edward Lawrence,	*Orange, N. J.,*	Mathematics.
Moore, Minnie Rose,	*Peoria,*	Eng. and Mod. Lang.
Morse, Jeddidiah D,	*Champaign,*	Electrical Eng'g.
Morse, Samuel Theodore,	*Carlinville,*	Civil Engineering.
Myers, James William,	*Chrisman,*	Eng. and Mod. Lang.
Naughton, Katherine Louise,	*Champaign,*	Eng. and Mod. Lang.
Noble, Isabelle,	*Urbana,*	Eng. and Mod. Lang.
Noble, Mary Elizabeth,	*Urbana,*	Latin.
Noble, William,	*Champaign,*	Classical.
Ogiwara, Chijokichi,	*Tokio, Japan,*	Mechanical Eng'g.
Orr, Edward Ellsworth,	*Quincy,*	Architecture.
Pfeffer, John Edward,	*Bondville,*	Electrical Eng'g.
Phillippi, Francis Marion,	*Burnside,*	Eng. and Mod. Lang.
Porter, Robert Knight,	*Champaign,*	Classical.
Reasoner, Matthew Aaron,	*Fisher,*	Natural Science.
Risor, Cady Alvern,	*Eureka,*	Electrical Eng'g.
Row, George Edward,	*Centralia,*	Mechanical Eng'g.
Sammis, John Langley,	*Jacksonville,*	Chemistry.
Sample, John C,	*Lebanon,*	Architectural Eng'g.
Saunders, Harry J,	*Chicago,*	Chemistry.
Sayers, William Wesley,	*Champaign,*	Mechanical Eng'g.
Schacht, Frederick William,	*Moline,*	Natural Science.
Scott, George Harvey,	*Rantoul,*	Eng. and Mod. Lang.
Shea, John Clark,	*Danville,*	Electrical Eng'g.
Simons, Alexander Martin,	*Quincy,*	Electrical Eng'g.
Smith, Louie Henrie,	*Crystal Lake,*	Chemistry.
Smith, Sherman,	*LeRoy,*	Architecture.
States, William Daniel,	*Elwood,*	Mechanical Eng'g.
Steele, William LaBarthe,	*Springfield,*	Architecture.
Stone, Percy Allyn,	*Bradfordton,*	Electrical Eng'g.
Strehlow, Oscar Emil,	*Champaign,*	Civil Engineering.
Sweney, Don,	*Gettysburg, Pa.,*	Mechanical Eng'g.
Teeple Wallace Douglas,	*Marengo,*	Architecture.
Thompson, Fred Lawrence,	*Isabel,*	Civil Engineering.
Van Orstrand, Charles Edwin,	*Pekin,*	Civil Engineering.
Vickery, Charles Roy,	*Dwight,*	Eng. and Mod. Lang.
deVries, Steven George,	*Pekin,*	Electrical Eng'g.
Wakefield, George Mighell,	*Waterman,*	Electrical Eng'g.

Webber, Hubert Anthony,	*Mt. Vernon,*	Architecture.
Weinshenk, Theodore,	*Champaign,*	Mechanical Eng'g.
Wharton, Rebecca Gaskin,	*Payson,*	Eng. and Mod. Lang.
White, Solon Marks,	*Sandwich,*	Natural Science.
Whitham, Myron Elwin,	*Warren,*	Mechanical Eng'g.
Whittemore, Floyd,	*Sycamore,*	Electrical Eng'g.
Williams, Robert,	*Carthage,*	Eng. and Mod. Lang.
Wills, George Arthur,	*Chicago,*	Electrical Eng'g.
Wright, Wilber Hoyt,	*Normal,*	Philosophy.

JUNIORS

Anderson, George Forbes,	*Carbondale,*	Civil Engineering.
Armstrong, James Ellis,	*Bondville,*	Eng. and Mod. Lang.
Barr, George Andrew,	*Joliet,*	Philosophy.
Beadle, Thomas B,	*Kewanee,*	Chemistry.
Beal, Alvin Casey,	*Mt. Vernon,*	Agriculture.
Beebe, Charles David,	*Evanston,*	Mechanical Eng'g.
Brandt, Eugene Hermann,	*Appleton City, Mo.*	Architecture.
Braucher, Ralph Waldo,	*Lincoln,*	Agriculture.
Brower, Lyle Ireneus,	*Champaign,*	Architecture.
Brown, Walter Burrows,	*Rock Falls,*	Chemistry.
*Brubaker, William Arthur,	*Robinson,*	Architecture.
Burke, William Harry,	*Champaign,*	Electrical Eng'g.
Capron, Frank Read,	*Carthage,*	Architecture.
Carpenter, Hubert Vinton,	*Argo,*	Electrical Eng'g.
Chester, Guy Jacob,	*Champaign,*	Electrical Eng'g.
Chester, Manly Earl,	*Champaign,*	Electrical Eng'g.
Clarke, Octave Besançon,	*Quincy,*	Electrical Eng'g.
Coffeen, Harry Clay,	*Champaign,*	Electrical Eng'g.
Crellin, Charles Virgil,	*Winfield, Ia.*	Electrical Eng'g.
Dewey, James Ansel,	*Urbana,*	Natural Science.
Dewey, Louise Sarah,	*Urbana,*	Natural Science.
Dull, William Raymond,	*Burlington, Kan.,*	Mech'cal Eng'g.
Dunlap, Elmer Edgar,	*Columbus, Ind.,*	Architecture.
Errett, Harry Boyd,	*Kewanee,*	Architecture.
Fergus, William Loveday,	*Chicago,*	Mechanical Eng'g.
Fischer, Louis Englemann,	*Shiloh,*	Municipal Eng'g.
Forbes, Ernest Browning,	*Urbana,*	Natural Science.
Forbes, Stuart Falconer,	*Urbana,*	Architecture.
Frees, Herman Edward,	*Chicago,*	Chemistry.

* Deceased.

Gayman, Bert A,	*Champaign,*	Mechanical Eng'g.
Gearhart, Orval Lee,	*Farmer City,*	Architectural Eng'g.
Grimes, George Lyman,	*Moline,*	Mechanical Eng'g.
Gulick, Clyde Denny,	*Champaign,*	Natural Science.
Hadsall, Harry Hugh,	*Wilmington,*	Civil Engineering.
Hammers, Morgan J,	*Champaign,*	Mechanical Eng'g.
Havard, Oliver David,	*Urbana,*	Electrical Eng'g.
Hobart, Albert Claude,	*Elgin,*	Civil Engineering.
Hopper, Georgia Etherton,	*Champaign,*	Eng. & Mod. Lang.
Horn, Carl John,	*Naperville,*	Architecture.
Howison, Charles,	*Sandwich,*	Architecture.
Hughes, Frank Alexis,	*Pueblo, Colo.,*	Civil Engineering.
Ice, Meldora,	*Gifford,*	Architecture.
Johnson, Martin Nathaniel,	*Moline,*	Mechanical Eng'g.
Keeler, Harry,	*Chicago,*	Chemistry.
Kirkpatrick, Asa Baird,	*Elmwood,*	Natural Science.
Kirkpatrick, Harold H,	*Mayview,*	Classical.
Kistner, Theodore Charles.	*Carlinville,*	Architecture.
Kratz, Laura,	*Monticello,*	Eng. & Mod. Lang.
Larson, Charles Sigurd,	*Chicago,*	Electrical Eng'g.
Leffler, Burton Rutherford,	*Naperville,*	Civil Engineering.
Leigh, Charles Wilbur,	*La Prairie Centre,*	Mathematics.
McFadden, Belle Lorraine,	*Champaign,*	Latin.
McLane, John Wallace,	*Boonsborough, Ia.,*	Chemistry.
Mann, Arthur Richard,	*Mannville, Fla.,*	Mech. Eng'g.
Manny, Fred Hugh,	*Mound,*	Natural Science.
Marsh, Loren William,	*Joliet,*	Electrical Eng'g.
Marsh, Norman Foote,	*Upper Alton,*	Architecture.
Morgan, Walter Montgomer	*Kinmundy,*	Eng. & Mod. Lang.
Munhall, Grace May,	*Champaign,*	Eng. & Mod. Lang.
Murphy, Francis Joseph,	*Long Grove, Ia.,*	Chemistry.
Noble, Harry Charles,	*Champaign,*	Eng. & Mod. Lang.
Norton, Belle,	*Urbana,*	Eng. & Mod. Lang.
Nye, Carl Merriman,	*Moline,*	Municipal Eng'g.
Oyler, Harry Schuyler,	*Mt. Pulaski,*	Chemistry.
Paine, Arthur Elijah,	*Rosemond,*	Classical.
Parr, John Louis,	*Wyoming, Wis.,*	Architecture.
Paul, Arthur Ernest,	*Chicago,*	Chemistry.
Pepper, William Allen,	*Joliet,*	Electrical Eng'g.
Pitney, Clarence Orville,	*Augusta,*	Natural Science.
Pohlman, John Edward,	*Joliet,*	Civil Engineering.

Poole, Edward Warren,	*Dover*,	Electrical Eng'g.
Pooley, William Vipond,	*Galena*,	Eng. and Mod. Lang.
Porter, Horace Chamberlain,	*Champaign*,	Classical.
Postlethwaite, Francis W. Henry,	*Toronto, Can.*,	Electrical Eng'g.
Randall, Dwight T,	*Augusta, Mich.*,	Mech. Eng'g.
Rayburn, Charles Clyde,	*Roseville*,	Chemistry.
Rheinlander, Albert William,	*Evansville, Ind.*,	Electrical Eng'g.
Rhodes, Ora M,	*Bloomington*,	Natural Science.
Sandford, Mrs. Eva Phillips,	*Champaign*,	Latin.
Shepardson, Ralph Steel,	*Aurora*,	Architecture.
Sherrill, Walter Dickens,	*Colona*,	Architecture.
Smith, Friend Orville,	*Ashton*,	Pharmacy.
Spencer, Fred Wilcox,	*Clinton, Ia.*,	Architectural Eng'g.
Steinwedell, George Otto,	*Quincy*,	Electrical Eng'g.
Terry, Charles Dutton,	*Kewanee*,	Mechanical Eng'g.
Thayer, Albert Lewis,	*New Castle, Pa.*,	Architecture.
Thompson, Susan Elizabeth,	*Bement*,	Eng. and Mod. Lang.
Trogdon, James Edmund,	*Paris*,	Electrical Eng'g.
Troth, William Voorhees,	*Wheatland, Ind.*,	Natural Science.
Vail, Walter Cheney,	*Kewanee*,	Architecture.
Vigal, William Myron,	*Edinburg*,	Civil Engineering.
Wallace, Herbert Milford,	*Chicago*,	Eng. and Mod. Lang.
Webster, Sarah Emeline,	*Champaign*,	Natural Science.
Wheldon, Clarence Sheldon,	*Emporia, Kan.*,	Electrical Eng'g.
Willett, Willam Marble,	*Yorkville*,	Electrical Eng'g.
Wills, Oscar T,	*Mendota*,	Electrical Eng'g.
Wray, David Couden,	*Elida*,	Civil Engineering.
Young, Charles Whittier,	*Chicago*,	Natural Science.
Zilly, Mabel Helen,	*Champaign*,	Latin.
Zimmerman, Walter,	*Earlville*,	Mechanical Eng'g.

SOPHOMORES

Aaron, Philip Judy,	*Big Neck*,	Electrical Eng'g.
Allen, Lewis Richard,	*Carbondale*,	Mechanical Eng'g.
Anderson, Clark Godfrey,	*Moline*,	Civil Engineering.
Arnold, Jay Jennings,	*Springfield*,	Natural Science.
Beasley, D Edythe,	*Urbana*,	Eng. and Mod. Lang.
Beatty, John Wirts,	*Delavan*,	Eng. and Mod. Lang.
Beem, Fred Clarkson,	*Ottawa*,	Architecture.
Berry, Erwin Howard,	*Paw Paw*,	Chemistry.
Bigelow, Mary C,	*Champaign*,	Mathematics.

Bocock, Clarence Edgar,	*Bradford,*	Eng. and Mod. Lang.
Boggs, Oliver Carter,	*Urbana,*	Latin.
Booker, Lucile Alice,	*Champaign,*	Eng. and Mod. Lang.
Breidert, Henry Cyrille,	*Havana,*	Civil Engineering.
Brockway, Edwin Ladue,	*Macomb,*	Electrical Eng'g.
Brode, Luther David,	*Urbana,*	Mechanical Eng'g.
Burkland, Theodore Leonard,	*Moline,*	Civil Engineering.
Campbell, Maude Permill	*Champaign,*	Art and Design.
Clark, Charles Albert,	*Vandalia,*	Electrical Eng'g.
Clark, Charles Richard,	*Champaign,*	Architecture.
Clark, Winfred Newcomb,	*Paxton,*	Electrical Eng'g.
Clayton, Thomas Wiley,	*Dixon,*	Civil Engineering.
Collins, Edgar Francis,	*Champaign,*	Electrical Eng'g.
Cooper, Edgar Cook,	*Mendota,*	Civil Engineering.
Corbus, Burton Robison,	*La Salle,*	Natural Science.
Craig, Wallace,	*Chicago,*	Natural Science.
Crathorne, Arthur R,	*Champaign,*	Electrical Eg'gn.
Davison, Chester Morton,	*Rock Falls,*	Architecture.
*Deming, Percy Corbus,	*Amboy,*	Architectural Eng'g.
Dickey, James Harvey,	*Urbana,*	Mathematics.
Dillon, William Wagner,	*Sheldon,*	Eng. and Mod. Lang.
Doney, Oliver Kinsey,	*Urbana,*	Classical.
DuBois, Alexander Dawes,	*Springfield,*	Electrical Eng'g.
Dunaway, Arthur Newton,	*Ottawa,*	Civil Engineering.
Dunkin, William Van,	*Urbana,*	Mathematics.
Eckles, Harry Edward,	*New Castle, Pa.,*	Civil Engineering.
Enochs, Claude Douglass,	*Champaign,*	Electrical Eng'g.
Enochs, Delbert Riner,	*Champaign,*	Classical.
Everhart, Rollin Orlando,	*Clinton,*	Classical.
Fetzer, William Ray,	*Ottawa,*	Eng. and Mod. Lang.
Fisher, Pearl,	*Savoy,*	Eng. and Mod. Lang.
Flanigan, Edwin Clark,	*Champaign,*	Architecture.
Fox, Fred Gates,	*Peru,*	Philosophy.
Frazey, Alice Belle,	*Urbana,*	Eng'g and Mod. Lang.
Fullenwider, Arthur Edwin,	*Mechanicsburg,*	Architecture.
Fulton, William John,	*Hartford City, Ind.,*	Eng. and Mod. Lang.
Garrett, Thomas B,	*Golden,*	Electrical Eng'g.
Gaston, George Horace,	*Chicago,*	Eng. and Mod. Lang.
Gee, Samuel Willard,	*Colburn, Ind.,*	Municipal Eng'g.

* Deceased.

Gerber, Winfred Dean,	*Rockford,*	Civil Engineering.
Goodridge, Henry Anthony,	*Chicago,*	Electrical Eng'g.
Graham, George Woods,	*Freeport,*	Civil Engineering.
Gray, Shirley Eugene,	*Griggsville,*	Chemistry.
Greene, Mary Avery,	*Urbana,*	Classical.
Hair, Charles Ernest,	*Galesburg,*	Architecture.
Hamm, Ira Lewis,	*El Paso,*	Mechanical Eng'g.
Hatch, Thomas Milford,	*Goshen, Ind.,*	Electrical Eng'g.
Hays, Don,	*Sidney,*	Civil Engineering.
Herwig, John Newton,	*Mason City,*	Mechanical Eng'g.
Hill, Irwyn Horatio,	*Joliet,*	Architecture.
Holcomb, Arthur Hiram,	*Sycamore,*	Mechanical Eng'g.
Hotchkiss, Robert James,	*Peoria,*	Architecture.
House, Leone Pearl,	*Sadorus,*	Latin.
Hudson, Isaac Beasly,	*Cairo,*	Latin.
Hughes, Arlington H,	*Mattoon,*	Latin.
Hughes, Emma Edna,	*Adams,*	Natural Science.
Hurd, Arthur Burton,	*El Paso,*	Electrical Eng'g.
Illingworth, Frank,	*Chicago,*	Civil Engineering.
Jackson, William John,	*Chicago,*	Civil Engineering.
Jordan, Helen,	*Tolono,*	Latin.
Jordan, Theodore Nelson,	*Tolono,*	Eng. and Mod. Lang.
Kendall, James Blaine,	*Momence,*	Mechanical Eng'g.
Kiler, William Henry,	*Urbana,*	Eng. and Mod. Lang.
Kingman, Charles Dudley,	*Mattoon,*	Civil Engineering.
Knorr, Carl Wolfsohn,	*Chicago,*	Electrical Eng'g.
Kuehne, Carl Oscar,	*Chicago,*	Architecture.
Kyle, Martha Jackson,	*Urbana,*	Latin.
Lentz, Caroline,	*Arcola,*	Latin.
Lindsay, Blanche,	*Onarga,*	Eng. and Mod Lang.
Linn, Francis David,	*Byron,*	Agriculture.
Linzee, Albert Carl,	*Du Quoin,*	Electrical Eng'g.
McCarty, Charles James,	*Rock Falls,*	Electrical Eng'g.
Marshutz, Joseph Hunter,	*Champaign,*	Classical.
May, Harry Monroe,	*Rochelle,*	Electrical Eng'g.
Mellen, Ernest Roy,	*Amboy,*	Electrical Eng'g.
Merker, Henry Fleury,	*Belleville,*	Electrical Eng'g.
Mesiroff, Josef,	*Chicago,*	Electrical Eng'g.
Mitchell, Frederick Alexander,	*Hillsboro,*	Mechanical Eng'g.
Morrow, Grace Eliot,	*Champaign,*	Natural Science.
Nelson, Fred Irwin,	*Buda,*	Mechanical Eng'g.

Neureuther, Andrew Henry,	*Peru,*	Mechanical Eng'g.
Nevins, John,	*Camp Point,*	Architecture.
von Oven, Frederick William,	*Naperville,*	Civil Engineering.
Owens, Dasie Margaret,	*Urbana,*	Natural Science.
Paul, Elmer Christian,	*Peoria,*	Chemistry.
Pease, Henry Mark,	*Malta,*	Electrical Eng'g.
Philips, Thomas Lewis,	*Mt. Carroll,*	Eng. and Mod. Lang.
Plym, Francis John,	*Aledo,*	Architecture.
Polk, Cicero Justice,	*Arcola,*	Latin.
Ponzer, Ernest William,	*Henry,*	Mechanical Eng'g.
Posey, Thomas,	*Peoria,*	Chemistry.
Reat, Fred Lee,	*Tuscola,*	Latin.
Ritchie, Andrew,	*Foosland,*	Civil Engineering.
Ross, Herbert Austin,	*Jerseyville,*	Architectural Eng'g.
Saunders, Rome Clark,	*Champaign,*	Electrical Eng'g.
Schneiter, Samuel,	*Paxton,*	Latin.
Shless, Charles Louis,	*Chicago,*	Philosophy.
Smith, Bruce,	*Newman,*	Latin,
Smith, Elmer Church,	*Columbus, Neb.,*	Civil Engineering.
Soper, Stanley Livingston,	*Champaign,*	Latin.
Staley, Joseph Clarence,	*Urbana,*	Classical.
Stone, Albert James,	*Quincy,*	Mechanical Eng'g.
Stoolman, Almond Winfield Scott,	*Champaign,*	Natural Science.
Strawn, John Harris,	*Albion,*	Classical.
Sunderland, Archer Henry,	*Delavan,*	Electrical Eng'g.
Thompson, Guy Andrew,	*Steward,*	Eng. and Mod. Lang.
Toenniges, Ferd. Fred'k Emil,	*Davenport, Ia.,*	Civil Engineering.
Van Horn, Merton Gates,	*Plainfield,*	Agriculture.
Van Meter, Seymour,	*Cantrall,*	Architecture.
Walker, Rufus, Jr.,	*Moline,*	Eng. and Mod. Lang.
Walter, Charles Albert,	*Sandwich,*	Chemistry.
Webster, Joshua Percy,	*Philadelphia, Pa.,*	Arch. Eng'g.
West, Roy Charles,	*Sycamore,*	Pharmacy.
Wetzel, Clyde Leigh,	*Traer, Ia.,*	Electrical Eng'g.
Wharf, Allison James,	*Olney,*	Civil Engineering.
Williamson, Albert St. John,	*Quincy,*	Mechanical Eng'g.
Wilson, Frederick Henry,	*Evanston,*	Electrical Eng'g.
Wingard, Lewis Forney,	*Champaign,*	Eng. and Mod. Lang.
Winter, Julia Flora,	*Urbana,*	Philosophy.
Wolcott, James Thompson,	*Peoria,*	Chemistry.
Woodworth, Minnie Barney,	*Champaign*	Eng. and Mod. Lang.

Woody, Frederick Way,	*Champaign*,	Philosophy.
Wuerffel, Herman Louis,	*Chicago*,	Electrical Eng'g.
Zink, George L,	*Litchfield*,	Chemistry.

FRESHMEN

Adolph, Peter,	*San Jose*,	Mechanical Eng'g.
Anderson, Harry,	*Sheldon*,	Electrical Eng'g.
Armstrong, Cecil Everett,	*Champaign*,	Pharmacy.
Armstrong, Frank Hall,	*Serena*,	Mechanical Eng'g.
Arps, George Frederick,	*Cary*,	Natural Science.
Barnickol, Adolph,	*Belleville*,	Architecture.
Barton, Walter Franklin,	*Homer*,	Natural Science.
Baxter, Charles Parker,	*Taylorville*,	Electrical Eng'g.
Beach, Wilfred Warren,.	*Sioux City, Ia.*,	Architecture.
Beckerleg, Gwavas Foster,	*Chicago*,	Civil Engineering.
Beekman, Jonathan Colby,	*Petersburg*,	Civil Engineering.
Benham, Cassius Earl,	*LaGrange, Ind.*,	Electrical Eng.
Bennett, Jay S,	*Paw Paw*,	Natural Science.
Bennett, Ralph,	*Chicago*,	Electrical Eng'g.
Bennett, Ruth,	*Chicago*,	Architecture.
Biebinger, Isaac Newton,	*Milmine*,	Natural Science.
Bierce, Fred Nelson,	*Dayton, Ohio*,	Mechanical Eng'g.
Bishop, George William,	*Urbana*,	Natural Science.
Bixby, Alice Persis,	*Danville*,	Natural Science.
Boggs, Arclissa Florence,	*Urbana*,	Art and Design.
Bonser, Frederick Gordon,	*Pana*,	Natural Science.
Boyd, Edward Parkman,	*Aledo*,	Architecture.
Bradley, James Clifford,	*Morrison*,	Mechanical Eng'g.
Branch, Elizabeth,	*Champaign*,	Natural Science.
Branch, James,	*Champaign*,	Pharmacy.
Bullard, Robert Irving,	*Mechanicsburg*,	Eng. & Mod. Lang.
Burroughs, Elmer,	*Savoy*,	Electrical Eng'g.
Busey, Charles Simpson,	*Urbana*,	Electrical Eng'g.
Busey, Laura,	*Urbana*,	Eng. and Mod. Lang.
Busey, Robert Oscar,	*Urbana*,	echanical Eng'g.
Bussey, Clyde George,	*Lanark*,	Mechanical Eng'g.
Byrne, Lee,	*Marshall, Minn.*,	Classical.
Capron, Clyde,	*Marion*,	Philosophy.
Carter, Henry Leslie,	*Girard*,	Mathematics.
Chacy, Ezra Cline,	*Hillsboro*,	Civil Engineering.

Chipps, Halbert Lilly,	*Sullivan,*	Architecture.
Church, Frank Wilson,	*Chicago,*	Architecture.
Chuse, Harry Arthur,	*Mattoon,*	Mechanical Eng'g.
Clark, Edith,	*Vandalia,*	Classical.
Clark, Mary Edith,	*Champaign,*	Classical.
Clark, Philip Henry,	*Galena,*	Latin.
Clarkson, John Joseph,	*Chicago,*	Latin.
Clifford, Charles Luther,	*Serena,*	Electrical Eng'g.
Clinton, Edgar Marcellus,	*Polo,*	Eng. and Mod. Lang.
Coats, Alice Lynette,	*Coats Grove, Mich.,*	Nat'l Science.
Conn, Ida May,	*Shelbyville,*	Eng. and Mod. Lang.
Craigmile, Esther Ann,	*Hinsdale,*	Latin.
Crissey, William Lewis,	*Roodhouse,*	Electrical Eng'g.
Curtis, Flora Elizabeth,	*Champaign,*	Eng. and Mod. Lang.
Dale, Elizabeth,	*Danville,*	Philosophy.
Defrees, Frederick Bradley,	*Indianapolis, Ind.,*	Civil Eng'g.
Dill, William,	*Little Rock, Ark.,*	Civil Eng'g.
Dillon, Roy Hodgson,	*Normal,*	Electrical Eng'g.
Dinwiddie, Virginia,	*Champaign,*	Natural Science.
Dixon, Hewitt Smith,	*Kankakee,*	Electrical Eng'g.
Dobbins, Donald Claude,	*Elliott,*	Eng. and Mod. Lang.
Dodds, George,	*Neoga,*	Electrical Eng'g.
Donaldson, Orville Louis,	*Charleston,*	Electrical Eng'g.
Dougherty, Andrew Jackson,	*Mound City,*	Electrical Eng'g.
Duncan, Clifford James,	*Lamoille,*	Electrical Eng'g.
Dunlap, William Helmle,	*Aledo,*	Electrical Eng'g.
Eagelston, Frank Wood,	*Bradford,*	Civil Engineering.
Eastman, Harry,	*Rock Island,*	Mechanical Eng'g.
Edwards, Frank Burch,	*Oneonta, N. Y.,*	Architecture.
Elliott, Mida Gertrude,	*Adelaide, Wash.,*	Natural Science.
Ely, Howard Montgomery,	*Peoria,*	Mechanical Eng'g.
Ermeling, Willard Walter,	*Chicago,*	Electrical Eng'g.
Espenhain, Frank Christ., Jr.,	*Belleville,*	Mechanical Eng'g.
Fairclo, George Cassius,	*Sycamore,*	Electrical Eng'g.
Fisher, Jacob G,	*Indianola,*	Chemistry.
Fithian, Sidney Breese,	*Newton,*	Eng. and Mod. Lang.
Fleager, Clarence Earl,	*Sheldon,*	Electrical Eng'g.
Flesch, Eugene William Penn,	*Chicago,*	Architectural Eng'g.
Forden, James Russell,	*Springfield,*	Mechanical Eng'g.
Foster, George Kenyon,	*Normal,*	Eng. and Mod. Lang.
Fowler, Robert Lambert,	*Charity,*	Civil Engineering.

Franklin, Irwin Chase,	*Lexington,*	Electrical Eng'g.
Fraser, William Alexander,	*La Salle,*	Mechanical Eng'g.
Freeman, Harry Eben,	*Millington,*	Natural Science.
Gilchrist, Hugh McWhurr,	*Gilchrist,*	Electrical Eng'g.
Ginzel, Rollin Francis,	*Trenton,*	Architecture.
Goodell, John,	*Chandlerville,*	Civil Engineering.
Graham, Archie James,	*Gallipolis, O.,*	Natural Science.
Graham, Hugh Joseph,	*Springfield,*	Eng. and Mod. Lang.
Griffin, Walter B,	*Elmhurst,*	Architectural Eng'g.
Griffith, George John,	*Savanna,*	Eng. and Mod. Lang.
Grimm, Fred,	*Canton,*	Civil Engineering.
Gunn, John C,	*Belleville,*	Natural Science.
Halderman, Edwin McAfee,	*Mt. Carroll,*	Eng. and Mod. Lang.
Ham, Willard Earl,	*Urbana,*	Mechanical Eng'g.
Hanson, Rachelle Margaret,	*Villa Grove,*	Natural Science.
Harris, Borden Baker,	*Quincy,*	Civil Engineering.
Harris, Charles Lee,	*Augusta,*	Architecture.
Harrower, John Charles,	*Barrington,*	Mechanical Eng'g.
Hart, Sterling Perry,	*Auburn,*	Natural Science.
Hatton, Edward Howard,	*Peru,*	Eng. and Mod. Lang.
Hawley, William Albert,	*Dundee,*	Civil Engineering.
Hay, Mark,	*Champaign,*	Architecture.
Hazlitt, Albert Nichols,	*Ottawa,*	Architecture.
Helton, Alfred Joseph,	*Atwood,*	Eng. and Mod. Lang.
Henley, William Wheeler,	*Mattoon,*	Mechanical Eng'g.
Herrick, Blanche Electa,	*Farmer City,*	Latin.
Higgins, Frank Leonard,	*Elmwood,*	Mechanical Eng'g.
Hines, Edward George,	*Huey,*	Architecture.
Hoagland, John C,	*Sheldon,*	Natural Science.
Honens, Hugh Benton,	*Milan,*	Pharmacy.
Hopkins, Milton Irwin,	*Indianapolis, Ind.,*	Elect. Eng'g.
Hougham, Frank B,	*Belleflower,*	Natural Science.
Housel, Oscar Lloyde,	*Urbana,*	Electrical Eng'g.
Hubbard, George Wallace,	*Urbana,*	Mechanical Eng'g.
Huber, Grace Emma,	*Charleston,*	Eng. and Mod. Lang.
Hughston, Allie Dellena,	*Urbana,*	Natural Science.
Hunter, Collett Spencer,	*Paris,*	Agriculture.
James, William Henry,	*Urbana,*	Architecture.
Johnson, Alva Myron,	*Decatur,*	Classical.
Johnson, Edwin Samuel,	*Sterling,*	Civil Engineering.
Johnston, Jessie May,	*Hinsdale,*	Latin.

Jones, Louise,	*Champaign,*	Eng. and Mod. Lang.
Jutton, Emma Reed,	*Champaign,*	Eng. and Mod. Lang.
Kable, James Franklin,	*Virden,*	Electrical Eng'g.
Kaeser, Albert Fred,	*Highland,*	Natural Science.
Kennard, Edward Morrison,	*Champaign,*	Eng. and Mod. Lang.
Ketchum, Daniel Clement,	*Champaign,*	Eng. and Mod. Lang.
Kettenring, Henry Sylvester,	*Pekin,*	Eng. and Mod. Lang.
Koch, Fritz Conrad,	*Elmhurst,*	Chemistry.
Kofoid, Nellie Ione,	*Normal,*	Natural Science.
Krahl, Benjamin Franklin,	*Aurora,*	Civil Engineering.
Lake, George Elbert,	*Williamsville,*	Agriculture.
Lamet, Louis Harman,	*Warsaw,*	Civil Engineering.
Landel, Ida Susan,	*Paxton,*	Eng. and Mod. Lang.
Latzer, John Albert,	*Highland,*	Agriculture.
Lawrence, Carroll Gray,	*Carbondale,*	Architectural Eng'g.
Leach, William Blake,	*McLean,*	Eng. and Mod. Lang.
Lee, Julian Liechaski,	*Memphis, Tenn.,*	Mech. Eng'g.
Leutwiler, Oscar Adolph,	*Highland,*	Mechanical Eng'g.
Lloyde, Clifford Luther,	*Champaign,*	Natural Science.
Loftus, Ella,	*Champaign,*	Eng. and Mod. Lang.
Lott, Harvey Vansyckle,	*Elmwood,*	Pharmacy.
McCormick, Elsie Drene,	*Champaign,*	Natural Science.
McCrory, Mary,	*Charleston,*	Classical.
Marker, William Franklin,	*Champaign,*	Architecture.
Meharry, Jesse Erle,	*Tolono,*	Eng. and Mod. Lang.
Mercil, Benoni Edward,	*Chicago,*	Electrical Eng'g.
Merrill, Stillwell Frederick,	*Collinsville,*	Chemistry.
Miner, Fred Graham,	*Adair,*	Agriculture.
Mitchell, Edwin Whitford,	*Round Grove,*	Agriculture.
Montgomery, Anne Beall,	*Reynolds,*	Natural Science.
Montgomery, Finis Ewing,	*Charleston,*	Latin.
Moore, Dwight Merritt,	*Monticello,*	Electrical Eng'g.
Munhall, Dola,	*Champaign,*	Eng. and Mod. Lang.
Naper, Herbert John,	*Chicago,*	Architectural Eng'g.
Newell, Mason Harder,	*Springfield,*	Latin.
Nichols, Bertha Vie,	*Champaign,*	Eng. and Mod. Lang.
Nichols, May Louise,	*Beloit, Wis.,*	Eng. and Mod. Lang.
Nickoley, Edward Frederick,	*Long Grove,*	Eng. and Mod. Lang.
Noterman, George,	*Hillsboro,*	Civil Engineering.
O'Brien, Marguerite Helen,	*Champaign,*	Eng. and Mod. Lang.
Odell, Rena May,	*Morrison,*	Latin.

Omer, Lewis,	*Clayton,*	Electrical Eng'g.
Owbridge, Lionel Herbert,	*Springfield,*	Architecture.
Owens, Wilkens Hoover,	*Champaign,*	Natural Science.
Oxer, George Carl,	*Macon,*	Electrical Eng'g.
Paul, Wesley Arthur,	*Peoria,*	Electrical Eng'g.
Payne, Ben,	*Osborn,*	Mechanical Eng'g.
Pixley, Arthur Homer,	*Ingraham,*	Eng. and Mod. Lang.
Pope, Edna Marian,	*Du Quoin,*	Eng. and Mod. Lang.
Postel, Fred Jacob,	*Mascoutah,*	Electrical Eng'g.
Predmore, Mahlon,	*Avon,*	Eng. and Mod. Lang.
Railsback, Robert J,	*Hopedale,*	Classical.
Rapp, George Leslie,	*Carbondale,*	Architecture.
Ray, Walter Thornton,	*Metamora,*	Eng. and Mod. Lang.
Raymond, Ruth Cleveland,	*Sidney,*	Eng and Mod. Lang.
Reely, Ernest Ralph,	*Spring Green, Wis.,*	Architecture.
Ritchey, Felix,	*Cadwell,*	Eng. and Mod. Lang.
Robbins, Walter,	*Canton,*	Civil Engineering.
Robinson, Phillip Sidney,	*Aurora,*	Electrical Eng'g.
Rolfe, Martha Deette,	*Urbana,*	Natural Science.
Schroeder, Arthur George,	*Chicago,*	Architectural Eng'g.
Schutt, Walter Robert,	*Belleville,*	Eng. and Mod. Lang.
Schuyler, James Chauncy,	*Sycamore,*	Mechanical Eng'g.
Scotten, Ernest Guy,	*Newman,*	Eng. and Mod. Lang.
Sears, Will Everett,	*Rock Island,*	Mechanical Eng.
Seely, Garret Teller,	*Oswego,*	Civil Engineering.
Shamel, Archibald Dixon,	*Taylorville,*	Agriculture.
Sheean, Henry David,	*Galena,*	Latin.
Sheldon, Carl Edmonds,	*Sterling,*	Latin.
Shumaker, Charles Clarence,	*Girard,*	Electrical Eng'g.
Smith, Charles Augustus,	*Mattoon,*	Architecture.
Smith, Joseph Clay,	*Cairo,*	Pharmacy.
Smoot, Elma,	*Danville,*	Latin.
Spurgin, Isaac Meigs,	*Urbana,*	Eng. and Mod. Lang.
Staley, Maggie Edith,	*Urbana,*	Latin.
Stern, Albert,	*Champaign,*	Philosophy.
Storment, Edgar Lafayette,	*Salem,*	Natural Science.
Storment, Mrs. Mary Hill,	*Salem,*	Natural Science.
Sumner, William Thompson,	*Emden,*	Eng. and Mod. Lang.
Summey, David Long,	*Buffalo, N. Y.,*	Electrical Eng'g.
Tait, Benjamin Franklin,	*Macon,*	Classical.
Taylor, Thomas Varence,	*Urbana,*	Eng. and Mod. Lang.

Tebbetts, George Edward,	*Chicago,*	Civil Engineering.
Temple, Harry Roberts,	*Elida,*	Architecture.
Theiss, Otto John,	*Sublette,*	Civil Engineering.
Thompson, George Mershon,	*Bement,*	Philosophy.
Thompson, Loren Berthel,	*Virginia,*	Civil Engineering.
Tompkins, Samuel Justine,	*Jacksonville,*	Electrical Eng'g.
Trapp, Albert Rubby,	*Lincoln,*	Philosophy.
Trapp, Harold Frederick,	*Lincoln,*	Philosophy.
Trippeer, Allen G,	*Peru, Ind.,*	Civil Engineering
Unzicker, William Luther,	*Hopedale,*	Classical.
Uppendahl, William John,	*Dalton City,*	Eng. and Mod. Lang.
Uthoff, Herman Conrad,	*Peru,*	Philosophy.
Vance, Cornelius Andrew,	*Elmwood,*	Architectural Eng'g.
Vance, William Herbert,	*Edwardsville,*	Mathematics.
Vial, Alice Mildred,	*Western Springs,*	Eng. and M. Lang.
Volk, Edmund,	*Mendota,*	Electrical Eng'g.
Waldo, Marie L,	*Champaign,*	Natural Science.
Walker, Herbert William,	*Dundee,*	Electrical Eng'g.
Walsh, James Tecumseh,	*Harvard,*	Eng. and Mod. Lang.
Weaver, Ben: Perley,	*Urbana,*	Natural Science.
Webber, Jonathan Clay,	*Urbana,*	Pharmacy.
Webster, William W,	*Urbana,*	Mechanical Eng'g.
Weirick, Ralph Wilson,	*Washington,*	Architecture.
Wernham, James Ingersoll,	*Marengo,*	Chemistry.
Western, Irving Mark,	*Dundee,*	Natural Science.
Whelpley, Cecilia,	*Cobden,*	Natural Science.
White, Harry W,	*Newman,*	Natural Science.
Whitmeyer, Mark Hubert,	*Danville,*	Architecture.
Willcox, Maurice Meacham,	*Elmore,*	Civil Engineering.
Wilmarth, George Henry,	*Aurora,*	Electrical Eng'g.
Wilson, Frank De Witt,	*Loda,*	Chemistry.
Wilson, Theron Campbell,	*Champaign,*	Eng. and Mod. Lang.
Woolsey, Lulu Catherine,	*Polo,*	Eng. and Mod. Lang.
Yeomans, Edith Marian,	*Danville,*	Chemistry.
Young, Bertram Otho,	*Le Roy,*	Philosophy.

SPECIALS

Adams, Maud,	*Elgin,*	Natural Science.
Alarcó, Joseph Maria,	*Valencia, Spain,*	Electrical Eng'g.
Alward, Grace Josephine,	*Canton,*	Music.
Ayers, Lois Sigourney,	*Urbana,*	Art and Design.

Barr, Joseph Martin,	*Joliet,*	Philosophy.
Brode, Arletta Elizabeth,	*Urbana,*	Natural Science.
Bronson, Nina Louisa,	*Urbana,*	Art and Design.
Brower, Florence,	*Champaign,*	Music.
Brunson, Charles Morton,	*Macomb,*	Latin.
Butler, Harry Charles,	*Effingham,*	Mechanical, Eng'g.
Carter, Mabel Carrie,	*Champaign,*	Art and Design.
Cary, Phoebe Katharyn,	*Champaign,*	Music.
Chester, Edith,	*Champaign,*	Art and Design.
Crawford, Emma,	*Champaign,*	Music.
Davidson, Jessie Fuller,	*Galesburg,*	Architecture.
Dennison, Charles Robert,	*Hubbard, Ohio,*	Architecture.
Draper, Charlotte Leland,	*Urbana,*	Eng. and Mod. Lang.
Dunlap, Helen Esther,	*Champaign,*	Art and Design.
Eldridge, Nettie Robinson,	*Galva,*	Eng. and Mod. Lang.
Fairchild, Oscar Harmon,	*Snyder,*	Chemistry.
Finch, Winfield Scott,	*Verona,*	Agriculture.
Foote, Frank Holmes,	*Macomb City, Miss.,*	Civil Eng'g.
Gould, Guy Torrence, Jr.,	*Chicago,*	Natural Science.
Grieme, Henry William,	*Amsterdam, N. Y.,*	Architecture.
Grinnell, Jessie Clare,	*Mayfair,*	Art and Design.
Hall, Lucia Knapp,	*East Lynn,*	Music.
Halls, Frank Ernest,	*Chicago,*	Architecture.
Hanson, Mattie Alice,	*Urbana,*	Art and Design.
Heath, Bessie Beatrice,	*Champaign,*	Eng. and Mod. Lang.
Hobbs, Lunda,	*Louisville,*	Eng. and Mod. Lang.
Ketchum, Mary Phronia,	*Champaign,*	Art and Design.
Koenig, Adolph,	*Hilltop, Kan.,*	Architecture.
Leal, Grace,	*Urbana,*	Music.
Lee, Mary Deming,	*Tiskilwa,*	Mathematics.
Mather, Grace Ella,	*Joliet,*	Art and Design.
Millar, Nellie Decker,	*Mattoon,*	Art and Design.
Moore, Lucy Kate,	*Pesotum,*	Music.
Moore, Walter Ellsworth,	*Pesotum,*	Mechanical Eng'g.
Nesbit, Mary Frances,	*Oakland,*	Natural Science.
Niccolls, Calvin Barnes,	*New Lenox,*	Electrical Eng'g.
Phillips, Theodore Clifford,	*Mt. Carroll,*	Civil Engineering.
Pike, Curtis F,	*Normal,*	Natural Science.
Quirk, Elizabeth,	*Champaign,*	Music.
Raynor, Annie,	*Champaign,*	Music.
Reynolds, Elodia May,	*Golden,*	Art and Design.

Rhoads, Emma May,	*Champaign,*	Eng. and Mod. Lang.
Riley, George Washington,	*Champaign,*	Art and Design.
Ryan, Sara Agnes,	*Chicago,*	Latin.
Sager, Ellen,	*Belvidere,*	Eng. and Mod. Lang.
Sconce, Harvey James,	*Sidell,*	Agriculture.
Seass, Samuel Lucas,	*Arthur,*	Philosophy.
Sheldon, Eunice,	*Urbana,*	Art and Design.
Skehan, Josephine,	*Ocean Springs, Miss.,*	Art, Design.
Sperry, James Franklin,	*Champaign,*	Philosophy.
Strauss, Edwin Nelson,	*St. Louis, Mo.,*	Mechanical Eng'g.
Swanson, August Frank,	*Peoria,*	Architecture.
Tarrant, William Henry,	*Champaign,*	Civil Engineering.
Townsend, Edmund Dell,	*Champaign,*	Pharmacy.
Van Patten, Ida,	*Steward,*	Art and Design.
Weaver, Edith Maria,	*Urbana,*	Eng. and Mod. Lang.
Westall, Rosa May,	*Sumner,*	Latin.
Wheeler, Walter Frank,	*Quincy,*	Agriculture.
Williams, Lewis H,	*Chicago,*	Mechanical Eng'g.
Wright, Mrs. Maie,	*Urbana,*	Music.
Wright, Marion,	*Urbana,*	Eng. and Mod. Lang.
Wurdeman, Charles,	*Columbus, Neb.,*	Architecture.

PREPARATORY

Abdill, Harold Blakley,	*Danville,*	Electrical Eng'g.
Alberts, Henry William,	*Emden,*	Eng. and Mod. Lang.
Ainsworth, William Pemberton,	*Champaign,*	Natural Science.
Allen, Frank Gilbert,	*Rock Island,*	Electrical Eng'g.
Allen, Roy Skillman,	*Harristown,*	Electrical Eng'g.
Appel, Henry Louis,	*Chicago,*	Architectural Eng'g.
Arthur, John Geigar,	*Aledo,*	Eng. and Mod. Lang.
Baker, Horatio Webber,	*Champaign,*	Mechanical Eng'g.
Bartholemew, Ross,	*Vermont,*	Electrical Eng'g.
Beal, John Franklin,	*Mt. Vernon,*	Natural Science.
Black, Alice Mary,	*Sadorus,*	Eng. and Mod. Lang.
Black, George McCall,	*Canton,*	Electrical Eng'g.
Black, Laura Louise,	*Sadorus,*	Eng. and Mod. Lang.
Boice, Elmer Ulysses,	*Buckley,*	Electrical Eng'g.
Bond, Dixon John,	*Champaign,*	Electrical Eng'g.
Bonnell, Everett Shannon,	*Lamoille,*	Electrical Eng'g.
Boyd, Hobart Sherman,	*Lewistown,*	Eng. and Mod. Lang.

Byerly, Edna Gertrude,	*Urbana,*	Latin.
Cabeen, Fred Earl,	*Aledo,*	Architecture.
Cabeen, Joshua Dale,	*Aledo,*	ElectricalEng'g.
Campbell, Ashton Ellsworth,	*Champaign,*	Classical.
Carson, Frank,	*Urbana,*	Eng. and Mod. Lang.
Churchill, Della Almon,	*Kinderhook,*	Electrical Eng'g.
Clark, Howard Wallace,	*Quincy,*	Architecture.
Coey, Robert Hill,	*Chicago,*	Architectural Eng'g.
Collins, Guy Richard,	*Champaign,*	Mechanical Eng'g.
Conner, Lawrence Beatty,	*Pana,*	Natural Science.
Cowell, Forrest M,	*Elwood,*	Mechanical Eng'g.
Cox, Edna Leone,	*Vermont,*	Eng. and Mod. Lang.
Crane, Zaide Varney,	*Champaign,*	Natural Science.
Dobbins, Ethel Irene,	*Ipava,*	Eng. and Mod. Lang.
Dobbins, Lester Charles,	*Ipava,*	Eng. and Mod. Lang.
Dolan, William John,	*Ohio,*	Philosophy.
Draper, Charlotte Enid,	*Urbana,*	Eng. and Mod. Lang.
Dunlop, Archibald Bard,	*Dwight,*	Eng. and Mod. Lang.
Ege, John Frank,	*Cordova,*	Natural Science.
Eignus, William Trumbo,	*Forrest,*	Natural Science.
Ellsworth, William Beverly,	*Deer Park,*	Civil Engineering.
Evans, Waldo Carl,	*Danville,*	Eng. and Mod. Lang.
Everett, Wirt,	*Chicago,*	Electrical Eng'g.
Farrelly, James Walter,	*Dawn,*	Mechanical Eng'g.
Flickinger, John Franklin,	*Lanark,*	Electrical Engineering.
Foohy, Thomas James,	*Ivesdale,*	Classical.
Foster, William Grant,	*Urbana,*	Classical.
French, Cora May,	*East Lynn,*	Eng. and Mod. Lang.
Gell, John James,	*Gilchrist,*	Natural Science.
Gerald, Charles Peter,	*Champaign,*	Civil Engineering.
Green, Frances Myrtle,	*Urbana,*	Eng. and Mod. Lang.
Green, Josephine Maxwell,	*Ramsey,*	Music.
Green, Mae Frances,	*Ivesdale,*	Eng. and Mod, Lang.
Griffin, William Ralph,	*Argenta,*	Eng. and Mod. Lang.
Griffiths, John, Jr.,	*Chicago,*	Civil Engineering.
Grigsby, Harry Mason,	*Blandinsville,*	Eng. and M. Lang.
Grigsby, Will Herman,	*Blandinsville,*	Eng. and M. Lang.
Griswold, Lewis Edwin,	*Blue Mound,*	Chemistry.
Grossman, Nathan,	*Lanark,*	Electrical Eng'g.
Gunder, Nell Blanche,	*Homer,*	Eng. and Mod. Lang.
Hallam, John Carter,	*Centralia,*	Natural Science.

Hannan, John Edward,	*Champaign,*	Classical.
Hanson, Gertrude Lucile,	*Urbana,*	Classical.
Harris, William Marks,	*Princeton,*	Latin.
Hartrick, Dinchen Clara,	*Urbana,*	Eng. and Mod. Lang.
Hartrick, Nancy Emma,	*Urbana,*	Eng. and Mod. Lang.
Hartrick, Louis Eugene,	*Urbana,*	Eng. and Mod. Lang.
Haussner, Charles, Jr.,	*Chicago,*	Mechanical Eng'g.
Heath, Noble Porter,	*Champaign,*	Agriculture.
Hedges, Charles Wilbur,	*Urbana,*	Pharmacy.
Higgins, Alice A,	*Perry,*	Classical.
Hodges, James Stewart,	*Denrock,*	Civil Engineering.
Hogans, Corban Bane,	*Browning,*	Eng. and Mod. Lang.
Hollerich, Cornelius Nicholas,	*Spring Valley,*	Pharmacy.
Hulsebus, Bernhard Lubertus	*Saxon, Ia.,*	Architecture.
Husk, Friederick William,	*Shabbona,*	Electrical Eng'g.
Huston, Frank Derz,	*Virden,*	Mechanical Eng'g.
Ijams, Catherine Harriet,	*Urbana,*	Natural Science.
Ireton, Philip Anthony,	*New Richmond, O.,*	Nat. Science.
Irwin, Claude Garrison,	*Long View,*	Eng. and Mod. Lang.
Iungerich, Charles Rider,	*Urbana,*	Natural Science.
Jacobson, Charles Herman,	*Englewood,*	Civil Engineering.
Kenney, Charles Francis,	*Divernon,*	Chemistry.
Ketchum, George Spencer,	*Champaign,*	Civil Engineering.
Kincaid, Charles Howard,	*Champaign,*	Natural Science.
Knox, William Forest,	*Peoria,*	Natural Science.
Kuhn, Leopold,	*Champaign,*	Electrical Eng'g.
Latzer, Jennie Mary,	*Highland,*	Natural Science.
Laugman, John Oscar,	*Lisbon,*	Natural Science.
LeFevre, George Winans,	*Fithian,*	Civil Engineering.
Lewis, Stanley Melville,	*Urbana,*	Architecture.
Lietze, Frank,	*Carlyle,*	Architecture.
Loeb, Oscar,	*Urbana,*	Eng. and Mod. Lang.
McCollum, Harvey Darling,	*Louisville,*	Eng. and Mod. Lang.
McLean, Elmer Lyman,	*Lombardville,*	Electrical Eng'g.
McLean, George Harvey,	*Normal,*	Agriculture.
Mack, John Michael,	*Viola,*	Electrical Eng'g.
Mahon, Thomas Francis,	*New York, N. Y.,*	Mech. Eng'g.
Mathews, Clyde Milton,	*Urbana,*	Eng. and Mod. Lang.
Mautz, Edmund Jacob,	*Stewardson,*	Natural Science.
Maxwell, Charles Edward,	*Odell,*	Pharmacy.
Meeks, Arthur Francis,	*Farina,*	Natural Science.

Mesler, John Dickinson,	*Cobden,*	Mechanical Eng'g.
Mills, Ralph Walter,	*Webster Groves, Mo.,*	Nat. Science.
Monier, Martha Vivian,	*Henry,*	Classical.
Monroe, John,	*Dallas, Tex.,*	Eng. and Mod. Lang.
Moorshead, Alfred Lee,	*St. Louis, Mo.,*	Architecture.
Mundy, Robert Stephen,	*Champaign,*	Electrical Eng'g.
Nabstedt, Frederick,	*Davenport, Ia.,*	Electrical Eng'g.
Noble, Ernest Henry,	*Brocton,*	Classical.
Osgood, Simon Milford,	*Marseilles,*	Civil Engineering.
Parker, Clay Dean,	*Dwight,*	Latin.
Peddicord, Jessie Mae,	*Champaign,*	Natural Science.
Perry, John Nevin,	*Malden*	Electrical Eng'g.
Phipps, Josie Mae,	*Eugene, Ind.,*	Eng. and Mod. Lang.
Pollard, Earle Royal,	*Centralia,*	Mechanical Eng'g.
Pope, Howard Blake,	*Du Quoin,*	Natural Science.
Post, Cora Mabel,	*Fithian,*	Classical.
Radebaugh, Stella May,	*Rippey, Ia.,*	Classical.
Raymond, John Eaton,	*Sidney,*	Agriculture.
Replogle, William Harry,	*Champaign,*	Electrical Eng'g.
Rhoads, Horace Adam,	*Champaign,*	Eng. and Mod. Lang.
Rhodes, Edward Melvin,	*Bloomington,*	Natural Science.
Roberts, Burt William,	*Magnolia,*	Eng. and Mod. Lang.
Roche, Edward Francis,	*Rock Island,*	Architecture.
Ryder, Gaylord C,	*Monticello,*	Electrical Eng'g.
Sheean, Frank Thomas,	*Galena,*	Latin.
Shuler, Hugh McWhurr,	*Gilchrist,*	Civil Engineering.
Smedley, Ralph Chestnut,	*Waverly,*	Eng. and Mod. Lang.
Sparks, Annie Elnora,	*Urbana,*	Classical.
Stanton, Burt Tompkins,	*Chicago,*	Mechanical Eng'g.
Stedman, Alfred Bennett,	*Champaign,*	Electrical Eng'g.
Stern, Walter Wolf,	*Champaign,*	Electrical Eng'g.
Stoltey, Emma Maria,	*Champaign,*	Eng. and Mod. Lang.
Stoltey, Jennie Florence,	*Campaign,*	Eng. and Mod. Lang.
Studer, Joseph Valentine,	*Peoria,*	Natural Science.
Tabaka, Albert James,	*Ivesdale,*	Natural Science.
Thompson, Risty Melroy,	*Mt. Erie,*	Mechanical Eng'g.
Thornton, Robert Ingersoll,	*Magnolia,*	Civil Engineering.
Trevett, Helen Mary,	*Champaign,*	Eng. and Mod. Lang.
Trevett, John Howard,	*Champaign,*	Natural Science.
Twyman. Frank A,	*Macomb,*	Architecture.
Van Brundt, Chester,	*Champaign,*	Natural Science.

Wain, Albert,	*Chicago,*	Civil Engineering.
Wait, Ernest Ludden,	*Urbana,*	Architecture.
Webber, Arthur,	*Galatia,*	Eng. and Mod. Lang.
West, Edward J,	*Muncie,*	Natural Science.
Wham, Anna Gertrude,	*Foxville,*	Natural Science.
White, Edna Noble,	*Fairmount,*	Natural Science.
White, Leila,	*Fairmount,*	Latin.
Wiley, Raymond Sly,	*Seymour,*	Mechanical Eng'g.
Wilson, Harry,	*Guthrie,*	Mechanical Eng'g.
Wright, Edith,	*Urbana,*	Eng. and Mod Lang.
Zilly. Fred McKinley,	*Champaign,*	Pharmacy.

SUMMER SCHOOL—1895

Adams, Alfred C,	———
Bassett, Victor Hugo,	*Aledo.*
Boggs, Lucile Pearl,	*Urbana.*
Boggs, Oliver Carter,	*Urbana.*
Brewer, Martha Maria,	*Lanham, Maryland.*
Clark, Cyril Balfour,	*Champaign.*
Clinton, Eva,	*Polo.*
Culp, Flora C,	———
Dunlap, Alice I,	———
Garber, John Frederick,	*Brighton.*
Graff, Mamie Elizabeth,	*Greenville.*
Harry, Stephen Arnold Douglas,	*Danville.*
Huber, Cecilia,	*Highland.*
Knight, Robert Franklin,	*Wichita, Kas.*
Kyle, Mrs. Manella	*Canton*
Leal, Rose,	*Urbana.*
Linder, Grace	———
McIntosh, Charles M,	*Bement.*
Magers, Samuel Dennis,	*Houston, Texas.*
Martin, John Madison,	*Bement.*
Moore, George Henderson,	*Vermilion Grove.*
Myers, James William,	*Chrisman.*
Power, Margaret C,	*Weston.*
Robinson, Lewis Archibald,	*White Post, Va.*
Tschudy, Ida Martha,	*Highland.*
Vetterliet, Anna S,	*Decatur.*
Williamson, Albert St. John,	*Quincy.*

WINTER SCHOOL IN AGRICULTURE—1896

Bronson, Ernest Roscoe,	*Urbana.*
Calvin, Evart,	*Huntsville.*
Center, Ralph A,	*Ottawa.*
Conaut, Lewis Philbrook,	*Plainfield.*
Funk, Carl A,	*Exeter.*
Goodnow, Fred Clinton,	*Salem.*
Harrison, William Cullen,	*Parkville.*
Haskell, Fritz Law,	*Exeter.*
Howell, Carrie Barnes,	*Champaign,*
Kelly, Charles Gideon,	*Ottawa.*
Leland, Jerome Aaron,	*Springfield.*
Luehm, Albert John,	*Highland.*
McKee, Eli Earl,	*Rising.*
Miller, Alvin George,	*Urbana.*
Monroe, Joshua Wales,	*Plainfield.*
O'Brien, Will,	*Groveland.*
Willett, Charles Edgar,	*Eberle.*
Wood, Leonidas Allerton,	*Sublette.*

SUMMARY OF STUDENTS—1895-96

	Men	*Women*	*Total*
Graduate School	15	5	20
Resident Graduates	1	7	8
Seniors	86	17	103
Juniors	89	11	100
Sophomores	117	16	133
Freshmen	191	43	234
Specials	27	39	66
Total in University	526	138	664
Preparatory School	119	32	151
Summer School, 1895	14	13	27
Winter School in Agriculture, 1896	17	1	18
	676	184	860
Deduct counted twice	4	1	5
Total	672	183	855

HOLDERS OF SCHOLARSHIPS, PRIZES, AND COMMISSIONS

HONORARY SCHOLARSHIPS

Adams,	Steinwedell, George O.
Carroll,	Carpenter, Hubert V.
Champaign,	Marble, Harry C.
Clinton,	Webster, Sarah E.
Coles,	Millar, Adam V.
Cook,	Bailey, Leonard L.
Du Page,	von Oven, Frederick W.
Edwards,	Strawn, John H.
Hancock,	Ketchum, Richard B.
Iroquois,	Dillon, William W.
Jackson,	Allen, Lewis Richard.
Jefferson,	Webber, Hubert A.
Kendall,	Seely, Garret T.
La Salle,	Clifford, Charles L.
Marion,	Row, George S.
Marshall,	Ponzer, Ernest W.
Pulaski,	Dougherty, Andrew J.
Rock Island,	Schacht, Frederick W.
Sangamon,	Porter, Robert K.
Stark,	Eagleston, Frank W.
Tazewell,	Van Orstrand, Charles E.
Whiteside,	Bradley, James C.
Will,	Barr, George A.
Williamson,	Capron, Clyde.
Winnebago,	Temple, Harry E.
Woodford.	Ray, Walter T.

ACCREDITED SCHOOL SCHOLARSHIPS

Aurora High School,	Krahl, Benjamin F.
Camp Point High School,	Nevins, John.
Galena High School,	Pooley, William V.
Mattoon High School,	Henley, William W.
Paxton High School,	Clark, Winfred N.
Urbana High School,	Staley, Joseph C.

CHICAGO CLUB LOAN FUND

Mesiroff, Joseph. Shless, Charles L.

WINNER OF THE HAZLETON PRIZE MEDAL

Cadet Corporal Milton I. Hopkins.

ROSTER OF OFFICERS AND NON-COMMISSIONED OFFICERS, BATTALION OF THE UNIVERSITY OF ILLINOIS

Major, F. H. Green.
First Lieutenant and Adjutant, H. C. Porter.
Sergeant Major, A. D. DuBois.
Band Leader, W. L. Steele.
Drum Major, H. F. Merker.

Co. A—Captain, R. K. Porter; First Lieutenant, C. W. Leigh; First Sergeant, M. I. Hopkins; Sergeants, D. R. Enochs, F. W. Clayton, E. C. Smith; Corporals, W. E. Sears, J. C. Harrower, L. Omer, S. J. Tompkins, W. W. Ermeling, C. A. Vance, W. H. Owens, G. J. Griffith.

Co. B—Captain, J. H. McKee; First Lieutenants, A. St. J. Williamson, O. T. Wills; First Sergeant, W. L. Fergus; Sergeants, F. W. Spencer, John Nevins, A. L. Thayer; Corporals, T. C. Phillips, G. M. Thompson, F. Grimm, W. A. Fraser, B. B. Harris, O. L. Housel, C. S. Hunter.

Co. C—Captain, J. E. Row; First Lieutenant, J. E. Trogdon; First Sergeant, W. R. Fetzer; Sergeants, A. C. Beal, F. Ritchie, S. L. Soper; Corporals, D. L. Summey, A. J. Dougherty, E. W. P. Flesch, C. A. Smith, F. J. Postel, J. C. Hoagland, F. B. Defrees, E. W. Mitchell.

Co. D—Captain, R. P. Brower; First Lieutenants, A. C. Hobart, W. M. Vigal; First Sergeant, O. M. Rhodes; Sergeants, T. B. Garrett, H. L. Wuerffel, A. R. Crathorne; Corporals, C. G. Lawrence, G. E. Lake, H. F. Trapp, W. Robbins, W. A. Hawley, C. H. Jacobson, F. C. Koch, A. Barnickol.

Battery—First Lieutenant, G. F. Anderson; First Sergeant, H. M. May; Sergeant, C. A. Clark; Corporals, I. M. Western, E. G. Hines, C. Capron.

1896

SEPTEMBER

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1897

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1897

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AUGUST

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1897

SEPTEMBER

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OCTOBER

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NOVEMBER

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DECEMBER

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THE UNIVERSITY CALENDAR

1896–97

FALL TERM—1896

Sept. 3, Thursday,	Entrance Examinations begin.
Sept. 7, 8, Monday and Tuesday.	Registration Days.
Sept. 9, Wednesday.	Instruction begins.
Nov. 2, Monday.	Latest date for announcing Subjects of Theses.
Nov. 26, Thursday.	Thanksgiving Recess.
Nov. 30, Monday.	Instruction resumed.
Dec. 16, Wednesday.	Term Examinations begin.
Dec. 18, Friday.	Term ends.

WINTER TERM—1897

Jan. 4, Monday.	Entrance Examinations.
Jan. 4, 5, Monday and Tuesday.	Registration Days.
Jan. 6, Wednesday.	Instruction begins.
Feb. 24, Monday.	Prize Debate.
March 22, Monday.	Term Examinations begin.
March 24, Wednesday.	Term Ends.

SPRING TERM—1897

March 30, Tuesday.	Registration Day.
March 31, Wednesday.	Instruction begins.
May 13, 14, Thursday and Friday.	University High School Conference.
May 14, Friday.	Interscholastic Oratorical Contest.
May 15, Saturday.	Interscholastic Athletic meet.
May 24, Monday.	Hazleton Prize Drill.
May 25, Tuesday.	Competitive Drill.
June 1, Tuesday.	Latest Day for Acceptance of These.

June 2, Wednesday.	Term Examinations begin.
June 6, Sunday.	Baccalaureate Address.
June 7, Monday.	Class Day.
June 8, Tuesday.	Alumni Day and Oratorical Contest.
June 9, Wednesday.	Twenty-sixth Annual Commencement.

FALL TERM—1897

Sept. 2, Thursday.	Entrance Examinations begin.
Sept. 6, 7, Monday and Tuesday.	Registration Days.
Sept. 8, Wednesday.	Instruction begins.
Nov. 1, Monday.	Latest date for announcing Subjects of Theses.
Nov. 25, Thursday.	Thanksgiving Recess.
Nov. 29, Monday.	Instruction resumed.
Dec. 15, Wednesday.	Term Examinations begin.
Dec. 17, Friday.	Term ends.

INDEX

Learning and Labor

CATALOGUE

OF THE

University of Illinois

(Postoffice, Champaign or Urbana, Ill.)

1896-97

URBANA, ILLINOIS
Published by the University

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604 South Mathews Avenue, U.

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918 West Green Street, U.

*U stands for Urbana; C for Champaign.

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Experiment Station Farm, U.

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UNIVERSITY OF ILLINOIS

LOCATION

The University of Illinois has its seat in Champaign County, in the eastern central part of the state, between the cities of Champaign and Urbana, within the corporate limits of the latter. It is one hundred and twenty-eight miles southward from Chicago, at the junction of the Illinois Central, the Cleveland, Cincinnati, Chicago and St. Louis, and the Wabash railroads. The country around is one of the richest and most prosperous agricultural regions of the world, and the local municipalities have a combined population of about 15,000.

HISTORY

In 1862 the national government donated to each state in the Union public land scrip apportioned in quantity equal to 30,000 acres for each senator and representative in congress, "for the endowment, support, and maintenance of at least one college, whose leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts. * * * * in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

Under this act Illinois received scrip for 480,000 acres of land subject to location in any surveyed but unoccupied part of the public domain. Twenty-five thousand acres were thus located in Nebraska and Minnesota, and the remainder of the scrip was sold for what it would bring. Of the land which was secured, about 14,000 acres have been sold at from $10.00 to $15.00 an acre. In compensation for waiting something more than a quarter of a century, the land, when all

sold, will have added to the endowment fund nearly as much as was obtained for the much greater proportion of the scrip originally sold. The entire principal sum received from the sale of scrip and of land is to be held inviolate as endowment, only the income being available for current expenditures.

To secure the location of the University several counties entered into a sharp competition by proposing to donate to its use specified sums of money, or their equivalent. Champaign county offered a large brick building, erected for a seminary and nearly completed, about 1,000 acres of land for a campus and farms, and $100,000 in county bonds. To this the Illinois Central railroad added $50,000 in freight. In consideration of this offer the institution was located, May 8, 1867, in the suburbs of Urbana, adjoining Champaign.

The state legislature has from time to time appropriated various sums for permanent improvements, as well as for maintenance. The present value of the entire property and assets is estimated at $1,600,000.

The institution was incorporated under the name of the Illinois Industrial University the last day of February, 1867, and placed under the control of a Board of Trustees, constituted of the Governor, the Superintendent of Public Instruction, and the President of the State Board of Agriculture, as *ex-officio* members, and twenty-eight citizens appointed by the Governor. The chief executive officer, usually called President, was styled Regent, and he was made *ex officio*, a member of the Board and presiding officer both of the Board of Trustees and of the Faculty.

In 1873 the Board of Trustees was reorganized by the reduction of the number of appointed members to nine and of *ex-officio* members to two, the Governor and the President of the State Board of Agriculture. In 1887 a law was passed making membership elective at a general state election and restoring the Superintendent of Public Instruction as an *ex-officio* member. There are, therefore, now three *ex-officio* members and nine by public suffrage. Since 1873 the President of the Board has been chosen by the members thereof from among their own number, for a term of one year.

The University was opened to students March 2, 1868, at which time there were present, beside the Regent, three professors and about fifty students. During the first term another

instructor was added, and there was a total enrollment of 77 students, all young men.

During the first term instruction was given in algebra, geometry, physics, history, rhetoric, and Latin. Along with this, work on the farm and gardens or around the buildings was compulsory for all students. But in March of the next year compulsory labor was discontinued, save when it was made to serve as a part of class instruction. A chemical laboratory was fitted up during the autumn of 1868, and students then began practical work in the department. Botanical laboratory work was commenced the following year. In January, 1870, a temporary mechanical shop was fitted up with tools and machinery, and in this little wooden building, originally constructed for a carpenter shop, was begun the *first shop instruction* given in any American university. During the summer of 1871 a large brick structure, the present Engineering Laboratory, was erected and equipped for students' shop work in both wood and iron. A diploma of merit was awarded for the exhibition in this line made at the Centennial Exposition.

By vote, March 9, 1870, the Trustees admitted women as students, and during the year 1870–71 twenty-four availed themselves of the privilege. Since that time they have constituted from one-sixth to one-fifth of the total number of students.

By the original state law certificates showing the studies pursued and the attainments in each were given instead of the usual diplomas and degrees. The certificates proved unsatisfactory to the holders, and, on petition of the alumni, the legislature, in 1877, gave the University authority to confer degrees.

Upon request of the alumni, seconded by the Trustees and Faculty, the legislature, in 1885, changed the name of the institution to the "University of Illinois."

During the same session of the legislature a bill was passed transferring the State Laboratory of Natural History from the Illinois State Normal University to the University of Illinois. This laboratory was created by law for the purpose of making a natural history survey of the state, with the publication of the results in a series of bulletins and reports, and for the allied purpose of furnishing specimens illustrative of the flora and fauna of the state to the public schools and to the state

museum. For these purposes direct appropriations are made by the legislature from session to session. A large amount of material has been collected and extended publications have been made in both the forms above mentioned.

By an act approved March 2, 1887, the national government appropriated $15,000 per annum to each state for the purpose of establishing and maintaining, in connection with the colleges founded upon the congressional act of 1862, agricultural experiment stations, "to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science." Under this provision the station for Illinois was placed under the direction of the Trustees of the University, and its grounds were located on the University farm. At least one bulletin of results is published every three months, and they are for gratuitous distribution. Editions of 17,000 copies are now issued.

For the more complete endowment of the state institutions founded upon the act of 1862, the congress of the United States, by a supplementary law passed in 1890, made further appropriations. Under this enactment each such college or university received the first year $15,000, the second $16,000, and likewise thereafter $1,000 per annum additional to the amount of the preceding year. The annual increase is to continue until the amount reaches $25,000, which sum is then to be paid yearly thereafter.

The total appropriations by the state to the University for all purposes to date amount to $1,303,000.

BUILDINGS AND GROUNDS

The land occupied by the University and its several departments embraces about 210 acres, including experimental farm, orchards, forest plantation, arboretum, ornamental grounds, and military parade grounds.

The *Chemical Laboratory* is a building 75 by 120 feet, and two stories high, besides a well lighted basement. It contains the general laboratories for students, instructors' laboratories, lecture rooms, store rooms, scale rooms, and various apartments for special purposes.

Engineering Hall has a frontage of 200 feet, a depth of 76 feet on the wings and 138 feet in the center. The first story contains the laboratories of the departments of physics and electrical engineering, and the masonry laboratories and instrument rooms of the department of civil engineering. The second story contains the lecture room and the preparation rooms of the department of physics, and the recitation and drawing rooms, cabinets, and studies of the departments of civil and municipal engineering. The third story contains the laboratory of the department of physics, the drawing rooms, lecture rooms, cabinets, and studies of the mechanical departments, as well as the library, the office, and the faculty parlor. The fourth story is devoted entirely to the department of architecture, and contains drawing and lecture rooms, cabinets, photo studio, and a blue-print laboratory.

The Engineering Laboratory is a brick building two stories high, 126 feet in length, and 88 feet in width, which contains the laboratory of applied mechanics, the hydraulic laboratory, and the mechanical engineering laboratory. The wood shop of the mechanical engineering department is situated on the second floor of this building. A room on the first floor is reserved as a repair shop, and is in charge of the Superintendent of Buildings and Grounds.

Machinery Building.—This is a one-story brick building, 50 by 250 feet. It contains a lecture room, two office rooms, a machine shop, a foundry, and a forge shop. The machine shop is 48 by 140 feet. Power is brought to this shop from the Engineering Laboratory by a 30 horse-power rope drive. A three-ton traveling crane of 12 foot span covers the center of the floor for the entire length, extending over a covered driveway between the machine shop and foundry. The floors of the foundry, cupola room, and forge shop are three feet below the floor of the machine shop. The building is well lighted. The slate roof is supported on steel roof trusses placed at 10 foot centers. The 2½ inch line shaft is carried by hangers at each truss.

Military Hall, 100 by 150 feet in one grand hall, gives ample space for company and battalion manœuvers and for large audiences upon special occasions. It is also used as a gymnasium, for which purpose there are dressing rooms with lockers. A bath room is provided.

Natural History Hall is a handsome building, 134 by 94 feet, with basement, two main stories, and an attic. It is occupied by the departments of botany, zoölogy, physiology, mineralogy, and geology, for each of which there are laboratories, lecture rooms, and offices; it also contains the office and equipments of the State Laboratory of Natural History, and of the State Entomologist, as well as the office and library of the Agricultural Experiment Station. There are six laboratory rooms on each of the main floors—sufficient altogether to accommodate two hundred students, besides offering abundant facilities for the private work of the instructors.

The Astronomical Observatory is a terra cotta brick building in the form of the letter T, the stem of which extends toward the south. The building fronts the north. The equatorial room, surmounted by the dome, is at the intersection of the stem and bar of the T. Besides the equatorial room the Observatory contains four transit rooms, a clock room, a recitation room, a study, and dark rooms for photographic purposes.

University Hall occupies three sides of a quadrangle, measuring 214 feet in front and 122 feet upon the wings. Besides numerous class rooms it contains the office of the President, the museum, the library, and the art gallery.

There are, in addition to these buildings, a veterinary hall, four dwellings, three large barns, and a greenhouse.

ART GALLERY

The University art gallery was the gift of citizens of Champaign and Urbana. It occupies a room 61 by 79 feet in University Hall, and furnishes an excellent collection of models for students of art. In sculpture it embraces thirteen full-size casts of celebrated statues, including the Laocoön group, the Venus of Milo, etc., forty statues of reduced size, and a large number of busts, ancient and modern, bas reliefs, etc., making over four hundred pieces in all. It includes also hundreds of large autotypes, photographs, and fine engravings, representing many of the great masterpieces of painting of nearly all the modern schools; also a gallery of historical portraits, mostly large French lithographs of peculiar fineness, copied from the great national portrait galleries of France.

Other collections of special value to art students embrace a large number of casts of ornament from the Alhambra and other Spanish buildings, presented by the Spanish government; a set of casts from Germany, illustrating German Renaissance ornament; a series of art work from the Columbian Exposition, and large numbers of miscellaneous casts, models, prints, and drawings, such as are usually found in the best art schools.

A notable feature of the collection of works of art is the gift of Henry Lord Gay, architect, of Chicago. It consists of a model in plaster and a complete set of drawings of a competitive design for a monument to be erected in Rome, commemorative of Victor Emanuel, first king of Italy. The monument was to be of white marble, an elaborate Gothic structure, beautifully ornamented, and 300 feet high. Its estimated cost was to have been seven and a quarter millions of francs. The design was placed by the art committee second on a list of 289 competitors.

LIBRARY

The library, selected with reference to the literary and scientific studies required in the several courses, had, March 1, 1897, 30,100 volumes and 6,350 pamphlets.

The large library hall is open throughout the day for study, reading, and reference work. On the same floor as the library is the reading room of the University, well supplied with daily papers and the more important weekly and monthly periodicals, both literary and scientific. The new library building, in process of erection, will soon enable the University to offer its members greatly increased library facilities.

The library of the State Laboratory of Natural History and that of the Agricultural Experiment Station are both open to students of the University. They contain over 6,000 volumes, and 15,000 pamphlets. These include 150 series of periodicals.

LABORATORIES

SCIENCE LABORATORIES*

The *botanical, geological, physiological, and zoölogical laboratories* are in Natural History Hall.

*For a more detailed account of these laboratories, see under the appropriate College.

The *chemical laboratory* occupies the building of the same name, already described.

The *physical laboratory* is in Engineering Hall. It is provided with piers, a constant temperature room, and other conveniences for measurement work.

The *psychological laboratory* in University Hall is well provided with apparatus of many different kinds for use in experimental study, research, and instruction.

ENGINEERING LABORATORIES

The *cement laboratory* of the department of civil engineering occupies two large rooms in Engineering Hall, and is provided with slate tables, testing machines, molding machines, sieves, etc., and twenty-four sample barrels of hydraulic cement, varieties of sand, and other necessary materials.

The *electrical engineering laboratory* is partly in Engineering Hall and partly in University Hall.

The *mechanical laboratory* occupies a large part of both floors of Engineering Laboratory and each of its departments is equipped for practical work by students.

The *laboratory of applied mechanics*, located in Engineering Laboratory, gives opportunity to students of the College of Engineering to make various practical experiments and tests, and to prosecute original investigation in their specialties.

SPECIAL LABORATORIES FOR RESEARCH

The *laboratory of the Agricultural Experiment Station* occupies a part of the basement of Natural History Hall.

The laboratory rooms of the *State Laboratory of Natural History* are in Natural History Hall.

A *Biological Experiment Station* has been established by the University on the Illinois River at Havana, Illinois, and equipped for field and experimental work in aquatic biology. It has its separate staff, but is open to students of the University at all times on application, and to special students not otherwise connected with the University during the summer months.

A laboratory for *sanitary water analysis* has recently been equipped with all necessary appliances, and chemical investigation of the water supplies of the state is now under way.

COLLECTIONS*

AGRICULTURAL

A large room in University Hall is devoted to the exhibition of the products of the industrial arts, especially of agriculture. Prominent among the agricultural specimens exhibited is an excellent collection of the sub-species and varieties of Indian corn, including the best of their kinds. There is also a considerable collection of small grains and of grasses; a collection of fibres in various states of manufacture; a series of analyses of grains, showing at a glance the elements and proportion of structure, and a large collection illustrating the forestry of Illinois, Florida, and California. The exhibits made by the University at the Centennial and at the Cotton Exposition at New Orleans find a permanent abode in this apartment; very large additions have also been made of materials received from the Columbian Exposition of 1893.

BOTANICAL

The herbarium contains nearly all the species of flowering plants indigenous to Illinois, including a complete set of grasses and sedges. The flora of North America is fairly well represented, and a considerable collection of foreign species has been made. A collection of fungi includes a very full set of those most injurious to other plants, causing rusts, smuts, moulds, etc. A collection of wood specimens from two hundred species of North American trees well illustrates the varieties of native wood.

Plaster casts represent fruits of many of the leading varieties as well as interesting specimens of morphology, showing peculiarities of growth, effects of cross-fertilization, etc.

ENGINEERING

The following departments of the College of Engineering have made extensive and very valuable collections which will be found in rooms in Engineering Hall.

ARCHITECTURE

A large number of specimens of stone, bricks, terra cotta, sanitary fittings, casts of moldings and of ornament have

*For a more detailed account of the collections in the different departments, see the appropriate subject under each College.

been accumulated, together with some excellent specimens of industrial arts, models of structures, working drawings of important buildings, 2,500 lantern slides, 20,000 plates and photographs, and the most necessary books.

CIVIL ENGINEERING

The Civil Engineering department has a large room containing samples of iron, steel, wood, brick, and stone; materials for roads and pavements; models of arches and trusses, one of the latter being full-sized details of an actual modern railroad bridge. The department also possesses a very large collection of photographs and blue-print working drawings of bridges, metal skeleton buildings, masonry structures, and standard railroad construction.

ELECTRICAL ENGINEERING

A number of display boards of wires and cables have been accumulated, together with collections of carbons, insulators, lighting specialties, signaling devices, primary and secondary cells, rail bonds, and several hundred photographs, blue prints, and pamphlets descriptive of the best modern practice in Electrical Engineering.

MECHANICAL ENGINEERING

This department owns a partial set of Reuleaux models, models of valve gears; sections of steam pumps, injectors, valves of various kinds, skeleton steam and water gauges, standard packings, steam-pipe coverings, drop forgings; fine examples of castings, perforated metal, sets of drills and samples of oil, plates from exploded boilers and examples of defective boiler plates, and samples of iron and steel. A large number of working drawings from leading firms and from the U. S. Navy Department form a valuable addition to the above collections.

GEOLOGICAL

Lithology is represented by type collections of rocks (2,900 specimens), arranged to illustrate Rosenbusch, from Voigt and Hochgesang, Dr. L. Eger, and A. Kranz; a type collection from Ward; a large number of ornamental building stones, and a stratigraphic collection to illustrate Illinois geology.

The *mineralogical* collection is especially rich in rock-

forming minerals, ores, and materials of economic value. It contains over 7,000 specimens which have been carefully selected to meet the wants of the student.

The *paleontological* collection (43,400 specimens) contains representative fossils from the entire geologic series, but is especially rich in palæozoic forms. It embraces the private collections of Dr. A. H. Worthen, including 650 type specimens; that of Tyler McWhorter, presented by himself; that of Rev. Mr. Hertzer, acquired by purchase; the Ward collection of casts, presented by Hon. Emory Cobb, and a considerable number of special collections representing the fauna and flora of particular groups.

A series of relief maps of noted localities adds greatly to the facilities for illustration.

ZOÖLOGICAL

The *zoölogical* collections have been specially selected and prepared to illustrate the courses of study in natural history, and to present a synoptical view of the zoölogy of the state.

The mounted mammals comprise an unusually large and instructive collection of the ruminants of our country, including male and female moose, elk, bison, deer, antelope, etc., and also several quadrumana, large carnivora and fur-bearing animals, numerous rodents, good representative marsupials, cetaceans, edentates, and monotremes. Fifty species of this class are represented by eighty specimens. All the orders, excepting the Proboscidea, are represented by mounted skeletons. There is also a series of dissections in alcohol, illustrating the comparative anatomy of the group.

The collection of mounted birds includes representatives of all the orders and families of North America, together with a number of characteristic tropical, Bornean, and New Zealand forms. The collection is practically complete for Illinois species. Many of the specimens are excellent examples of artistic taxidermy. There is also a fine collection of the nests and eggs of Illinois birds. A series of several hundred unmounted skins is available for the practical study of species, and the internal anatomy is shown in alcoholic dissections and in mounted skeletons of all the orders.

The cold-blooded vertebrates are represented by a series of mounted skins of the larger species, both terrestrial and marine; mounted skeletons of typical representatives of the principal groups; alcoholic specimens, both entire and dissected; and casts. The alcoholics include series of the reptiles, amphibians, and fishes, the latter comprising about three hundred species. The dissections illustrate the internal anatomy of the principal groups. The casts represent about seventy-five species, nearly all fishes.

The Mollusca are illustrated by alcoholic specimens of all classes and orders, and dissections showing the internal anatomy of typical forms. There are several thousand shells belonging to seventeen hundred species. The collection of Illinois shells is fair but incomplete.

Of the Arthropoda the entomological cabinet contains about three thousand species (principally American), named, labeled, and systematically arranged. There is also a series of Crustacea, some dried, but mostly in alcohol, the latter including a number of dissections.

The lower invertebrates are represented by several hundred dried specimens and alcoholics, and by a large series of the famous Blaschka glass models.

The embryology of vertebrates and invertebrates is illustated by a set of Ziegler wax models, and several series of slides, sections, and other preparations.

In addition to the above, the extensive collections of the State Laboratory of Natural History are available for illustrative purposes, as well as for original investigation by advanced students.

ADMISSION

Applicants for admission to the freshman class must be at least sixteen years of age, and it is desirable that they should be two or three years older than this.

Entrance may be made at any time, provided the candidate is competent to take up the work of the classes then in progress; but it is better to begin upon the first collegiate day in September, when a large number of the classes are organized, very many of them to continue during the year.

Admission to the freshman class of the University may be obtained in one of four ways: (a) by certificate from an accredited high school; (b) by examination; (c) by transfer of credits from some other college or university; (d) by obtaining permission to enter certain classes as a special student.

ADMISSION BY CERTIFICATE FROM ACCREDITED HIGH SCHOOLS*

Certain public high schools and a few private preparatory schools have been, after examination, approved by the Faculty of the University, and full graduates of these schools are admitted to the freshman class without examination. Candidates for admission in this way must file with the Registrar upon entrance a certificate of graduation and of preparatory studies. Blanks for these certificates must be obtained of the Registrar in advance, and it is better to forward them to him for approval before registration days.

ADMISSION BY EXAMINATION

Examinations of candidates for admission to the University are held at the University on the Thursday, Friday, and Saturday before the beginning of the fall term in September, and on the two days previous to the opening of each of the other terms. Each candidate must be in attendance during the whole period of the examinations.

*For an account of these, see "Accredited High Schools." (Consult Index.)

The scholarship examinations* held each year on the first Saturday in June and the day preceding, in counties in which there are applicants for state scholarships, afford an opportunity to pass the entrance examinations before coming to the University, as the examinations will be equivalents.

The subjects upon which the entrance examinations are held are described below.

The text-books are named merely to aid in showing the requirements. Equivalents are accepted.

The examinations which a candidate is required to pass depend in part on which of the four colleges of the University he intends to enter. In the following statement of subjects for examination, those requirements which are common to all the colleges are given first; then follow statements of the additional requirements for each college. To determine on what subjects he must pass examinations, then, a candidate must add to the uniform requirements first stated those classed as additional for the particular college he wishes to enter.

SUBJECTS IN WHICH ALL CANDIDATES FOR ADMISSION MUST BE EXAMINED

[For additional requirements for the different colleges, see pages 32-34.]

1. ALGEBRA.—Fundamental operations, factoring, fractions, simple equations, involution, evolution, radicals, quadratic equations, and equations reducible to the quadratic form, surds, theory of exponents, and the analysis and solution of problems involving these. The subject as given in Wells's Higher Algebra through quadratic equations, or the same work in Wentworth's Algebra, or an equivalent.

2. COMPOSITION AND RHETORIC.—Correct spelling, capitalization, punctuation, paragraphing, idiom, definition, and proper use of rhetorical figures; the elements of Rhetoric. The candidate will be required to write two paragraphs of about one hundred and fifty words each to test his ability to use the English language.

3. ENGLISH LITERATURE.—(a) Each candidate is expected to have read certain assigned literary masterpieces, and will be subjected to such an examination as will determine whether or not he has done so. The books assigned for the next three years are as follows:

1897.—Shakspere's As You Like It; Defoe's History of the Plague in London; Irving's Tales of a Traveler; Hawthorne's Twice-Told Tales; Longfellow's Evangeline, and George Eliot's Silas Marner.

1898.—Milton's Paradise Lost, Books I. and II.; Pope's Iliad, Books

* See "Scholarships." (Consult Index.)

I. and XXII.; The Sir Roger de Coverley Papers in The Spectator; Goldsmith's The Vicar of Wakefield; Coleridge's Ancient Mariner; Southey's Life of Nelson; Carlyle's Essay on Burns; Lowell's Vision of Sir Launfal; Hawthorne's House of the Seven Gables.

1899.—Dryden's Palamon and Arcite; Pope's Iliad, Books I., VI., XXI., and XXIV.; The Sir Roger de Coverley Papers in the Spectator; Goldsmith's The Vicar of Wakefield; Coleridge's Ancient Mariner; De Quincey's Flight of a Tartar Tribe; Cooper's Last of the Mohicans; Lowell's Vision of Sir Launfal; Hawthorne's House of the Seven Gables.

(b) In addition to the above, the candidate will be required to present a brief outline of American Literature. Hawthorne and Lemmon's Outline of American Literature, or an equivalent.

4. GEOMETRY.—Plane Geometry, as given in Wells's or Wentworth's Geometry, or an equivalent. Great importance is attached to the ability of the student to solve original problems.

5. HISTORY.—At least one year in one of the following subjects: (a) English and United States History; (b) General History; or (c) Greek and Roman History. The following text-books indicate the scope of the requirements: Guest and Underwood's Handbook of English History; Thomas's History of the United States; Oman's History of Greece; Allen's Short History of the Roman People; Myers's General History.

6. PHYSICS.—The elements of physical science as presented in such text-books as Appleton's School Physics, or Avery's Elements of Natural Philosophy, or Carhart and Chute's Elements of Physics, or Gage's Elements of Physics. The candidate must have had laboratory practice equivalent to that described in the laboratory text-books of Hall and Bergen, Allen, or Chute. The candidate's laboratory note-book will be accepted as part of the examination.

In addition to the preceding subjects, any two of the following:

7. ASTRONOMY.—The subject as given in Young's Elements of Astronomy, or Newcomb and Holden's Astronomy for High Schools.

8. BOTANY.—The subject as given in Bergen's Elements of Botany or its equivalent. The text of Gray's School and Field Book of Botany with such laboratory work, preferably including the use of the compound microscope, as is outlined in the former book, is accepted; but laboratory practice in any case is essential. The ability to determine species and some knowledge of the most important families of flowering plants are required.

9. CHEMISTRY.—Elementary Inorganic Chemistry as presented in Freer's Elementary Chemistry; Shepard's Elements of Chemistry; Williams's Elementary Chemistry; Storer and Lindsey's Manual of Elementary Chemistry; Armstrong and Norton's Laboratory Manual of

Chemistry, or Clark's Elements of Chemistry. Laboratory practice is essential for preparation in this subject.

10. PHYSIOLOGY.—The anatomy, histology, and physiology of the human body and the essentials of hygiene, taught with the aid of charts and models and demonstrations upon inferior animals, to the extent given in Martin's Human Body (Briefer Course).

11. ZOÖLOGY.—The subject as taught in the best high schools with laboratory facilities. Mere text-book work will not be accepted. The following will indicate the scope of the work required: Colton's Practical Zoölogy; Parker's Elementary Biology, and Thompson's Outlines of Zoölogy.

ADDITIONAL REQUIREMENTS FOR ADMISSION TO THE COLLEGE OF LITERATURE AND ARTS

[The following, in addition to the requirements on pages 30–32.]

12. ENGLISH LITERATURE.—The candidate will be examined on the form and substance of one or more books in addition to those named under (3), p. 30. For 1897, 1898, and 1899 the books will be selected from the lists below. The examination will be of such a character as to require a minute and thorough study of each of the works named in order to pass it successfully.

1897.—Shakspere's The Merchant of Venice; Burke's Speech on Conciliation with America; Scott's Marmion, and Macaulay's Life of Samuel Johnson.

1898.—Shakspere's Macbeth; Burke's Speech on Conciliation with America; De Quincy's The Flight of a Tartar Tribe; Tennyson's The Princess.

1899.—Shakspere's Macbeth; Milton's Paradise Lost, Books I. and II.; Burke's Speech on Conciliation with America; Carlyle's Essay on Burns.

13. LATIN.—Four books of Cæsar's Commentaries, six orations of Cicero, six books of Vergil's Æneid, the scansion of hexameter verse and Latin composition based on the reading above specified. Increasing importance is placed on ability to write Latin and on a knowledge of the quantity of the vowels. Candidates are urged to make special preparation in these directions. It is recommended that not more than two books of Cæsar be read, and that other authors be substituted for the books omitted. Equivalents for any of the above requirements will be accepted. Allen and Greenough's, Bennett's, or Harkness's Latin Grammar is recommended and Collar's or Daniell's Latin Prose Composition. The Roman pronunciation is used. Frequent oral reading throughout the whole of the preparatory course is especially urged.

Students desiring to pursue Greek in the University must have

also the following, which will be accepted instead of the three sciences OTHERWISE *required.*

14. GREEK.—Grammar, a thorough knowledge of forms and syntax; an amount of Prose Composition equal to that given in Woodruff's Greek Prose Composition; three books of Homer's Iliad, except lines 494-759 of Book II.; three books of Xenophon's Anabasis, or an equal amount of text from some other classic prose author.

ADDITIONAL REQUIREMENTS FOR ADMISSION TO THE COLLEGE OF ENGINEERING

[The following, in addition to the requirements stated on pages 30-32.]

15. FREE-HAND DRAWING.—Ten hours a week for one term, or the equivalent thereof. The nature of the work is indicated by Cross's Free-hand Drawing.

16. GEOMETRY.—Solid and spherical geometry as given in Wells's or Wentworth's Plane and Solid Geometry, or an equivalent.

One of the following:

17. FRENCH.—Elements of grammar, tested by the translation of simple French prose at sight. At least one year's work. Chardenal's Complete French Course, or an equivalent, and about 300 pages of easy prose.

18. GERMAN.—Elements of grammar, tested by the translation of easy German prose. At least one year's work. Joynes-Meissner's German Grammar, Joynes's German Reader, or equivalents, and 100 pages of easy prose.

19. LATIN.—Elements of grammar, tested by the translation of easy Latin prose. At least one year's work. Allen and Greenough's Grammar and Viri Romae, or an equivalent.

ADDITIONAL REQUIREMENTS FOR ADMISSION TO THE COLLEGE OF SCIENCE

[The following, in addition to the requirements stated on pages 30-32.]

16. GEOMETRY.—Solid and spherical geometry as given in Wells's or Wentworth's Plane and Solid Geometry, or an equivalent.

One of the following:

17. FRENCH.—Elements of grammar, tested by the translation of simple French prose at sight. At least one year's work. Chardenal's Complete French Course, or an equivalent, and about 300 pages of easy prose.

18. GERMAN.—Elements of grammar, tested by the translation of easy German prose. At least one year's work. Joynes-Meissner's German

Grammar, Joynes's German Reader, or equivalents, and about 100 pages of easy prose.

19. LATIN.--Elements of grammar, tested by the translation of easy Latin prose. At least one year's work. Allen and Greenough's Grammar, and Viri Romae, or an equivalent.

ADDITIONAL REQUIREMENT FOR THE COLLEGE OF AGRICULTURE

[The following, in addition to the requirements stated on pages 30–32.]

16. GEOMETRY. Solid and spherical geometry, as given in Wells's or Wentworth's Plane and Solid Geometry, or an equivalent.

PROGRAM OF EXAMINATIONS, SEPT. 9--14, 1897

All persons who wish to enter the University at the opening of the fall term, 1897, except those holding certificates of graduation from accredited schools and scholarship certificates and those for whom a transfer of all entrance credits from some other college or University has already been approved, must present themselves at the Registrar's office, room 14, University Hall, at 9 o'clock a. m., Thursday, September 9th. At that time applications for admission will be received, and applicants will be given all necessary directions as to examinations.

The program of examinations is as follows:

History	Thursday	1:00 p.m.
Physics	"	3:00 "
Algebra	Friday	8:00 a.m.
Physiology	"	1:00 p.m.
Botany	"	3:00 "
Geometry	Saturday	8:00 a.m.
Zoölogy	"	1:00 p.m.
German	"	3:00 "
English Literature and Composition	Monday	8:00 a.m.
French	"	1:00 p.m.
Chemistry	"	3:00 "
Latin	Tuesday	8:00 a.m.
Free-hand Drawing	"	9:00 "
Astronomy	"	1:00 p.m.
Greek	"	3:00 "

ADMISSION BY TRANSFER FROM OTHER COLLEGES AND UNIVERSITIES

A person who has entered another college or university of recognized standing will be admitted to this University upon his presenting a certificate of honorable dismissal from

the institution from which he comes and an official statement of the subjects upon which he was admitted to such institution, provided it appears that the subjects are those required here for admission by examination, or real equivalents. Candidates, to enter the University in this way, should submit such papers to the Registrar before the time of entrance, so that all doubtful points may be cleared up in advance.

ADMISSION AS SPECIAL STUDENTS

Persons over twenty-one years of age, not candidates for a degree, may be admitted to classes, after satisfying the President and professor in charge of the department in which such classes are taught, that they possess the requisite information and ability to pursue profitably, as special students, the chosen subjects. Such students are not matriculated; they pay a tuition fee of five dollars a term and incidental fees.

ADMISSION TO ADVANCED STANDING

After satisfying in some of the ways already enumerated all the entrance requirements for admission to the freshman class of the college which he wishes to enter, the applicant for advanced standing may secure such standing either by examination or by transfer of credits from some other college or university.

1. *By Examination.*—Candidates for advanced standing, not from other colleges or universities, may secure such standing on examination only. In the case of freshmen students seeking advanced standing on the basis of their preparatory work, such standing shall be granted after satisfactory examination only.

2. *By Transfer of Credits.*—Credits from other colleges or universities may be accepted by the Faculty for advanced standing; but at least one year's residence at the University and the completion of one year's work are necessary to secure a bachelor's degree.

In all cases, a certificate of honorable dismissal is required, together with a certified record of work done in the institution from which the applicant comes. These should be presented for approval some time before the student enters for work.

REGISTRATION

At the beginning of each term each student must present himself for registration within the time set for that purpose before the formation of classes, and he must be present at the first exercise of each class he is to attend.

EXAMINATIONS

Examinations are held as often as in the judgment of the instructor the necessities of the work require. Examinations are also given at the close of each term, on the work of the term, in all subjects except those whose character renders it unnecessary or impracticable. Students who are conditioned in these examinations are required to take a second examination soon after the beginning of the following term. Those who fail to pass the term examination are precluded from proceeding with any University work without special permission.

A record is kept of each student's standing.

TERMS AND VACATIONS

The University year is divided into three terms. The first covers fourteen weeks of instruction and each of the others eleven. There is a vacation of two weeks at the end of the first term, and of one week at the end of the second. For the dates of opening and closing see the "Calendar."

GRADUATION

The requirements for graduation are specified under the several colleges. Consult the Index.

ADMINISTRATION OF THE UNIVERSITY

GOVERNMENT

The government of the University is vested by the Trustees primarily in the President of the University, in the Faculty, in the Council of Administration, and in the Deans. The President is the executive head of the University.

The Dean of the General Faculty has general oversight of the instructional work of the University, and especial supervision of the graduate school. By order of the Board of Trustees he also fills the office of Vice-President.

The dean of each college is responsible for the enforcement of all University regulations within his college.

The Council of Administration is composed of the President, the Dean of the General Faculty, and the deans of the separate colleges. It constitutes an advisory board to the President, *and has exclusive jurisdiction over all matters of discipline.*

The Council does not exercise general legislative functions, but when any matter arises which has not been provided for by rule or common usage or legislative action by the General Faculty, and which cannot be conveniently laid over till the next meeting of the General Faculty, it may act upon the same according to its discretion, and its action in such cases is not subject to reversal by the General Faculty.

The determination of the general internal policy of the University is in the hands of the Faculty.

The faculties of the different colleges of the University are composed of the members of the instructional forces of these colleges, and have jurisdiction over all matters which pertain exclusively to their colleges, subject always to higher University authority.

ORGANIZATION

For the purpose of more efficient administration, the University is divided into several colleges and schools. This division does not imply that the colleges and schools are educationally distinct. They are interdependent and together form a unit. In addition to the courses mentioned as given in each college, instruction in military science and physical training is provided. The organization is as follows:

I. The College of Literature and Arts.
II. The College of Engineering.
III. The College of Science.
IV. The College of Agriculture.
V. The Graduate School.
VI. The Law School.
VII. The School of Pharmacy.

THE COLLEGE OF LITERATURE AND ARTS

The College of Literature and Arts offers—

1. General courses, classified according to the principal line of work chosen.

2. Specialized courses, or courses under the group system, including—
   a. The Classical Group.
   b. The English and Modern Language Group.
   c. The Philosophical Group.
   d. The Political Science Group.

3. Courses in Music, both vocal and instrumental.
4. A course preparatory to Law.

THE COLLEGE OF ENGINEERING

The College of Engineering offers courses—

1. In Architecture.
2. In Architectural Engineering.
3. In Civil Engineering.
4. In Electrical Engineering.
5. In Mechanical Engineering.
6. In Municipal and Sanitary Engineering.

THE COLLEGE OF SCIENCE

The College of Science offers courses arranged in four groups, as follows—

1. The Chemical and Physical Group.
2. The Mathematical Group.
3. The Natural Science Group.
4. The Philosophical Group.

THE COLLEGE OF AGRICULTURE

The College of Agriculture offers—

1. A course leading to Animal Husbandry as a specialty.
2. A course leading to Horticulture as a specialty.
3. A term's work, running through the winter term, offered to students not otherwise enrolled.

THE GRADUATE SCHOOL

The Graduate School offers courses in—

1. Agriculture.
2. Engineering.
3. Literature, Philosophy, and the Arts.
4. The Sciences.

An enumeration of the departments of graduate study is given at the beginning of "General Description of Courses" (see Index), and the separate graduate courses offered are described in connection with the proper subjects in the list of courses which there follows.

THE LAW SCHOOL

The Law School offers a course of study, leading to admission to the State Bar, and to the degree of Bachelor of Laws. Part of the work required for the degree, amounting in all to about one year of study, is provided for in the political science courses of the College of Literature and Arts, and includes Economics, History, Public Law and Administration, and a term's work in Argument offered by the department of Rhetoric.

Fuller information will be given in a special circular to be issued in June.

THE SCHOOL OF PHARMACY

The School of Pharmacy offers courses in all branches necessary to a complete scientific and practical knowledge of pharmacy, including pharmacy, chemistry, materia medica, botany, physics, and physiology.

COLLEGE OF LITERATURE AND ARTS

FACULTY

Andrew S. Draper, LL.D., President.
David Kinley, Ph.D., Dean, Economics and Sociology.
Thomas J. Burrill, Ph.D., LL.D., Botany.
Samuel W. Shattuck, C.E., Mathematics.
Charles W. Rolfe, M.S., Geology.
Arthur W. Palmer, Sc.D., Chemistry.
Frank F. Frederick, Art and Design.
Herbert J. Barton, A.M., Latin.
Charles M. Moss, Ph.D., Greek.
Daniel K. Dodge, Ph.D., English.
Daniel H. Brush, Captain 17th Infantry, U. S. A., Military Science.
Arnold Tompkins, A.M., Pedagogy.
Walter Howe Jones, Music.
George W. Myers, M.L., Mathematics.
Henry E. Summers, B.S., Physiology.
Edgar J Townsend, Ph.M., Mathematics.
Evarts B. Greene, Ph.D., History.
Katharine Merrill, A.B., English.
William O. Krohn, Ph.D., Psychology.
Harry S. Grindley, Sc.D., Chemistry.
T. Arkle Clark, B.L., Rhetoric.
Herman S Piatt, A.M., Romance Languages.
Arthur H. Daniels, Ph.D., Secretary, Philosophy.
Percy F. Bicknell, A.M., Librarian.
George D. Fairfield, A.M., Romance Languages.
Charles W. Tooke, A.M., Public Law and Administration.
Henry H. Everett, Physical Training.
George D. Hammond, A.B., History.
Fred A. Sager, B.S., Physics.

Frank Smith, A.M., Zoölogy.
John E. McGilvrey, A.B., Pedagogy.
George H. Alden, Ph.D., History.
Ralph P. Smith, Ph.D., German.
Helen E. Butterfield, M.L., Rhetoric.
Jeremiah G. Mosier, B.S., Geology.
Charles F. Hottes, M.S., Botany.
Edward J. Lake, B.S., Art and Design.
Ella H. Morrison, Physical Training for Women.
George W. Schmidt, A.M., German.
Adeline W. Rowley, B.M., Vocal Music.
Arthur S. Patterson, Ph.B., French.
David H. Carnahan, A.B., French.
George A Huff, Jr., Coach of Athletic Teams.
Mary M. Cole, A.B., Fellow, Rhetoric.
Charles H. Garnett, A.B., Fellow, Economics.
George F. Anderson, Military.

AIMS AND SCOPE

The College of Literature and Arts includes those branches usually comprised in a department of philosophy and arts, with the exception of the natural sciences. The aim of the College is a double one: to furnish a liberal education, and to afford the largest opportunity for specialization in literary and philosophical subjects. It is believed that this double purpose can be best accomplished by a judicious combination of disciplinary and information studies, which, while so directing the work of the student as to secure the desired mental training, shall also allow him large liberty of choice both in his main lines of work and in subjects auxiliary thereto.

In accordance with this general plan, it is provided that students may graduate either under the general course system or under the specialized course, or group, system.

THE GENERAL COURSE SYSTEM

A general course is one in which less than three years' work in any one subject, or group of allied subjects, is required for graduation, and in which no thesis is required.

In the general courses a minimum of prescribed work is

laid out for the first two years. The whole of the work for the first year, and part of that of the second, is prescribed. The work for the rest of the course is elective. Within the limits of the prescribed work, moreover, the student is permitted a choice of lines of work.

In choosing his electives, each student must select at least two subjects from the major electives.

In the choice of his electives other than his major work the student may take a minimum of work in a maximum number of subjects, or he may take a maximum amount of work in the minimum number of subjects necessary to fill up his time according to the rules of the University.

The elective courses open to the students of the College include subjects from the Colleges of Science and Engineering. The sciences are not an integral part of the work of the College, but the training derived from their study is so important a part of a liberal education that every student of the College is earnestly advised to extend his study of them so far as may be.

THE SPECIALIZED COURSE, OR GROUP, SYSTEM

A specialized, or group, course is one containing at least two years of major work in a single subject preceding the senior year, followed by an additional year of major work in that subject, and the writing of an acceptable thesis. No student may be enrolled in a specialized course without the permission of the head of the department in which he wishes to do his principal work, and each student who wishes to be so enrolled must specify the course he desires to enter not later than the beginning of his junior year.

In the specialized course, or group, system the prescribed work is the same as in the general course system. The other credits necessary for graduation are to be obtained in the subjects of the group which the student enters. (See requirements for graduation, below.)

Only those students who pursue a specialized course shall, as a rule, be selected from this College for fellowships, scholarships, and other similar University honors.

The groups are as follows:

The *Classical Group*, including Greek and Latin as the major subjects.

The *English and Modern Language Group*, including English, French, German, Italian and Spanish. At present Italian and Spanish may not be chosen as major subjects.

The *Philosophical Group*, including Pedagogy, Philosophy, Psychology, and Mathematics as major subjects. In this group the second year of the student's work is devoted to studies specifically preparatory to the principal subject, which is itself taken up at the beginning of the third year.

Students in this group who make Philosophy a major must, in the second year, make three full term-credits from among these subjects: Anthropology, Psychology, Economics 6 (Sociology), Greek 5.

Those who make Psychology their major subject must, in their second year, make three full term-credits from among these subjects: Botany 1b, c; Economics 6; Philosophy 1, 8; Physiology 1, 2; Zoölogy 3.

When Pedagogy is the major, three second year credits must be obtained in Logic (Philosophy 8) and two terms of Psychology.

Those students who make mathematics their major work must take the following courses in mathematics—2, 4, 6, 7, 8, 9, 10, 11, 15, 16, 17, and elect as many more courses as desired. They must also make three credits in Philosophy (including Philosophy 8), and either 6 credits in German or 3 credits in French.

The *Political Science Group*, including Economics, History, and Public Law and Administration. All students in this group must take the three elementary courses: History 1, Economics 1, and Political Science 1; and must also take at least one term's work in Philosophy, selected from courses 1, 2, 3, 4, and 8. All students in the group must, before the beginning of the junior year, have taken one year's work in either French or German, or must give other satisfactory evidence of their ability to use freely at least one of these languages.

REQUIREMENTS FOR GRADUATION

UNDER THE GENERAL COURSE SYSTEM

Forty full term-credits, including Military, are required for graduation under the general course system. Every

student must take the prescribed subjects; in addition, he must select at least two subjects from the list of major electives, and he must then choose work sufficient to yield him the remainder of his necessary credits.

No credits will be granted in any subject in either list except according to the enumeration given. For example, if work is offered in a subject for from three to six credits, no credit will be allowed for less than three terms' work.

UNDER THE SPECIALIZED COURSE, OR GROUP, SYSTEM

Forty full term-credits, including Military, together with an acceptable thesis, are required for graduation under the group system. Every student must take the prescribed subjects. In addition he must, not later than the beginning of his junior year, specify the group in which he wishes to graduate. He must at this time select one subject in the group as his major subject, the study of which, alone or with the subjects designated as specifically preparatory* to it, he must pursue during the remaining two years, securing therein at least nine full term-credits. He must also select, with the approval of the head of the department in which his major subject lies, a sufficient number of other studies to yield him the necessary complement of credits, and he must present an acceptable thesis.

The thesis required for graduation must be on a topic connected with the student's major study. It must present the results of investigation made under the immediate supervision of the instructor during the last year of the student's course. This work of investigation shall be the required work in the major subject, in whole or in part, during that year, and shall receive credit like any other study. Separate credit will not be given for the thesis.

No credit will be allowed in any subject except according to the enumeration given, and the same work shall not be credited both as major and minor work.

The only degree given in this college is that of A. B.

The prescribed studies must be taken in the term and year indicated in the outline of courses by years and terms.

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* See p. 43.

IN MUSIC

Students in the department of Music may receive a certificate of graduation by complying with the following conditions:

Students of the piano, organ, or violin must complete the entire course specified for these instruments; must also complete the work offered in harmony, covering four terms, and must take one year's work (3 credits) in either German or French.

Students of the voice must complete the entire course offered in vocal work, the four terms' work in harmony, and one year's work on the piano, besides taking one year (3 credits) of German or French, and one year (3 credits) of Italian.

Students expecting to graduate in any of the above courses in music must also pass a satisfactory examination in the History of Music, and must write a thesis on some musical subject.

Students enrolled in the department of music only, pay no term fees, but must pay the music fees. (See "Fees:" consult Index.)

CLASSIFICATION OF SUBJECTS

PRESCRIBED

Advanced Algebra (Math. 1, 2), $1\frac{1}{5}$ credits.

English 1; $1\frac{1}{5}$ credits.

French 1, German 1, Greek 1, 2, 3, or Latin 1, 2, 3; 3 credits.

Geometry, Solid (Math. 19); 1 credit.

History 1; $1\frac{4}{5}$ credits.

Logic (Philosophy 8); 1 credit.

Military 1, 2; 2 credits.

*Natural Science; 3 credits.

Rhetoric 1; 2 credits.

Trigonometry (Math. 3, 4); $\frac{4}{5}$ credit.

ELECTIVE

MAJOR COURSES

Economics 1 to 8, 100; 6 to 14 credits.

English 1 to 14; 6 to $21\frac{3}{5}$ credits.

*The three credits required in science may be obtained by taking a single subject through the year, or by combining single-term minors.

French 1 to 4; 6 to 12 credits.
German 1 to 4; 6 to 12 credits.
Greek 1 to 9; 6 to 9 credits.
History 1 to 12; 6 to $15\frac{3}{5}$ credits.
Latin 1 to 10; 6 to 10 credits.
Mathematics 1 to 24; 6 to $16\frac{1}{5}$ credits.
Pedagogy 1 to 6; 6 credits.
Philosophy 1 to 7, 9; 6 credits.
Public Law and Administration 1 to 9; 6 to $9\frac{3}{5}$ credits.
Psychology 1 to 9; 6 to 9 credits.
Rhetoric 1 to 4; 6 credits.

MINOR COURSES

The necessary number of credits additional to those provided for in the prescribed subjects and the required two major electives, may be secured from any of the subjects offered in the College of Literature and Arts, or in the College of Science, the requirements for which the student can meet.

COURSES OF INSTRUCTION BY YEARS AND TERMS

All the prescribed subjects must be *finished by the end of the sophomore year.*

The following statement gives the years and terms in which *they must be taken.* Students in the general course who take Greek *and* Latin may omit the science required.

FIRST YEAR

1. Advanced Algebra (Math. 1, 2); French 1, 5*, German 1, 5*, Greek 1, or Latin 1; Military 1, 2; Natural Science: Chemistry 1; Zoölogy 10, 11; Rhetoric 1.

2. French 1, 5, German 1, 5, Greek 2, or Latin 2; Military 1, 2; Natural Science: Chemistry 2, 3a; Geology 4; Zoölogy 1, 2, 3; Rhetoric 1; Advanced Algebra and Trigonometry (Math. 1 and 3).

3. French 1, 5, German 1, 5, Greek 3, or Latin 3; Geometry, Solid (Math. 19); Military 2; Natural Science: Astronomy 4a; Botany 6; Chemistry 2, 3b, 4, 20; Zoölogy 1, 2, 8; Rhetoric 1.

SECOND YEAR

1. English 1; History 1; Natural Science: Botany 1; Chemistry 1; Physiology 4; Physics 1 and 3; Zoölogy 1, 3, 10, 11; Military 2; Electives.

*Students in the College of Literature and Arts are permitted to take the scientific French and German if they are pursuing *major* work in Economics, Mathematics, Pedagogy, Philosophy, or Psychology, in a specialized course.

2. English 1; History 1; Natural Science: Botany 1; Chemistry 2, 3a; Geology 4; Physiology 6; Zoölogy 1, 2, 3; Military 2; Electives.

3. English 1; History 1; Logic (Philos. 8); Natural Science: Astronomy 4a; Botany 1, 6; Chemistry 2, 3b, 4, 20; Physiology 5; Zoölogy 1, 2, 8; Military 2; Electives.

The studies of the third and fourth years are all elective.

COURSE PREPARATORY TO LAW

Students who desire a course of study leading to the A.B. degree and at the same time furnishing special training for a course in the Law School, are advised to take the course outlined below, after finishing the prescribed subjects.

Students who take this course while working for their first degree will be able to complete the course for the degree of LL.B. in the law school in two years.

The work of the course may be begun in either sophomore or junior year.

The course provides for $18\frac{3}{5}$ credits, which, with those earned in the prescribed subjectsmake up $35\frac{3}{5}$ of the forty required for graduation. The remainder may be elected from among any of the offerings of the College of Literature and Arts.

If the course is begun in the sophomore year it should be taken in the following order:

FIRST YEAR

The subjects prescribed for freshman year.

SECOND YEAR

Economics 1, 2; English 1; History 1; Logic (Philosophy 8); Military 2; Public Law and Administration 1, 2.

THIRD YEAR

Economics 3 or 3a, and 4 or 4a, or 5; History 3; Public Law and Administration 4, 5, or 6.

FOURTH YEAR

History 4; Public Law and Administration 5 or 6, 7, 8; Rhetoric 4.

If the course is begun in the junior year, the following order must be followed:

JUNIOR YEAR

Economics 1, 2; History 3; Public Law and Administration 1, 2.

SENIOR YEAR

Economics 3 or 3a, 4 or 4a, or 5; History 4; Public Law and Administration, 5 or 6, 7, 8; Rhetoric 4.

DESCRIPTION OF DEPARTMENTS

ART AND DESIGN

This work subserves a threefold purpose: (1) It affords students the opportunity to acquire such a knowledge of free-hand drawing as their chosen courses may require. (2) It offers such as have a talent or taste for art the best facilities for pursuing studies in all branches of fine art. (3) It offers those who wish to become teachers of drawing special opportunities for study.

Special students, not otherwise connected with the University, may enter this department upon payment of moderate fees. For such students a fourth year of work is offered in drawing, painting, modeling, or design, as they may elect.

Lectures are given each year on lettering, design, historic ornament, perspective, and the theory of color. Students are required to submit one or more plates in each subject.

ECONOMICS

The work in economics for undergraduates is so arranged that the student can take a continuous course for from one to three years. The introductory courses are repeated each year, and the advanced courses are divided into two groups and given in alternate years. The courses are designed to cover as large a field as possible in the literature of the subject, and to present all disputed matters from different points of view. Educational development, acquaintance with the subject, and training for good citizenship, are ends kept steadily in view.

Minor courses in sociology are provided for in the department.

ENGLISH LANGUAGE AND LITERATURE

The courses are designed to give a continuous view of the twofold subject from the earliest times to our own day. In the junior and senior years double courses are offered, so that students, having had the fundamental work of the sophomore year, may, if desired, confine themselves either to philology or to literature. The aim in the study of literature is to approach the works of an author from the philosophical, emotional, and esthetic, as well as from the merely linguistic and historical points of view.

FRENCH

(See Romance Languages, p. 55.)

GERMAN

Four years of instruction are offered in this subject. The first year's class is taught in two divisions; one comprised of students whose purpose is to acquire a knowledge of German literature; the other, of those who wish merely a reading knowledge of the language for scientific or technical purposes. The methods of instruction in each division are adapted to the ultimate aims of the study.

The work of the second year is carried on according to the same plan. Course 2 offers a full year of readings in classic and modern German and composition; course 6 offers two terms of scientific and technical reading. The students are arranged in groups and classes, so as to give each practice in reading in his own special line.

The third year's work consists of the critical study of the classic poets, rapid reading of modern writers, composition, conversation, and lectures on Modern German Literature.

The work of the fourth year is the elementary study of Gothic, Old and Middle High German, and the further study of German Literature. Lectures and instruction are given in German.

GREEK

The general purpose of the courses laid out in this subject are: first, to teach the Greek language; second to train students to appreciate its literature; and third, to call attention to those numerous problems in the history, thought, and institutions of the Greeks, which illustrate similar phenomena noticeable among ourselves. To accomplish the first object, due attention is paid to the principles of grammar, particularly by making the syntax appear as the evidence of orderly mental procedure, and by continual practice in extemporaneous translation. The second is effected by a study of the surroundings and spirit of an author, and of those literary devices which give character to his productions. The third end is reached through familiar talks upon suitable topics as they are met.

Courses 7 and 8 offer a mature line of work, for which

courses 1 to 6 are a preparation. Ample library and other appliances are provided. Course 9 is more general, but is expected to articulate, for classical students, with courses 1-8, and to supply a consistent outline of the history of the institutional life of the Greeks.

HISTORY

The work of this department begins with an elementary course, prescribed for sophomores, in the history of mediæval and modern Europe. The advanced undergraduate work falls into two main divisions, mediæval history and modern history. The undergraduate courses are, finally, followed in each division by the seminary. These historical seminaries are designed for graduates and for seniors of high standing, who have had the requisite preliminary training.

Throughout the courses the effort is made not merely to give students a general knowledge of historical facts, but also to give them some conception of the aims and methods of historical science, and of the materials with which it deals. To this end exercises in historical investigation, more or less elementary, will form a prominent part of the work in all the higher undergraduate courses, as well as in the seminaries.

ITALIAN

See Romance Languages, p. 55.

LATIN

The courses at present offered in Latin are ten in number and extend over three years. The first term's instruction is, as far as needed, grammatical, prominence being given to Latin writing as the best method of acquiring a mastery of the language.

As soon as this preliminary work is done, the attention is directed to two ends. The first is the acquisition of a constantly increasing power to read the language with ease and pleasure. The thought is constantly emphasized that students are not simply reading Latin; they are reading some of the great literary masterpieces of the world, and should enjoy them as such. The second aim is to introduce the student to the daily life of the Roman; to make his home life vivid, his political life a reality. The contribution of the Roman

world to the language, literature, and institutions of our time is so great that an intimate acquaintance with that life is of the highest educational value.

The courses offered include a teachers' class. The work is based on the needs of those teaching preparatory Latin, and methods of presentation, difficulties, aims, and results are discussed. The members of the class do the work that they, as teachers, should require of their pupils, and at intervals take charge of the recitation.

MATHEMATICS

The object of the instruction in pure Mathematics is to promote habits of mental concentration and continuity of thought, to develop the capacity to form and combine abstract conceptions, and to cultivate deductive reasoning. The course is so arranged as to meet the requirements of those who wish to fit themselves for instructors, and of those who study the science for the love of it.

The mathematical courses open to students of the College of Literature and Arts, include the entire offering of the University in pure mathematics, with the view of meeting the desire of those students who wish to make mathematics a specialty without taking the applied mathematics required in the mathematical group of the College of Science.

MILITARY SCIENCE

The work of the department of Military Science is prescribed for all male students. The department therefore belongs to all the colleges alike. A full description of the work offered and of the aims and scope of the department will be found farther on in the catalogue. (Consult the Index.)

MUSIC

The department of music, during the past two years, has been greatly strengthened and offers superior advantages to those who desire a thorough musical education. The courses offered are widely varied, and are arranged to meet the needs of individual students. The time that may be devoted to the subject, especially in the study of an instrument or the voice, is indefinite; however, a regular course is laid out

which can be completed by any student of average ability within the period indicated.

The courses in music lead to graduation from the department with a diploma showing the amount of work accomplished by the student. The course in the history of music may be taken for credit by regular students in the College of Literature and Arts according to the conditions specified under "Music" in the description of courses.

In addition to these opportunities the students are privileged to hear good music interpreted by artists of recognized ability. A course of artists' concerts is given each season under the management of the department of music. In these concerts, to which an admission fee is charged, only artists of the best reputation appear.

The instructors in the department of music give recitals and lectures on musical subjects during the year.

PEDAGOGY

The work of the department of pedagogy is designed for those who desire a more thorough and philosophic knowledge of the principles and practice of teaching than can be gained from the other means of professional preparation furnished by the State. It seeks to give a comprehensive insight into school education, its phases, and problems; and thus to be of special service to those who are to hold commanding positions in school work. The course is elastic, and, in so far as possible, will be adjusted to suit the needs of the classes of students taking the work.

PHILOSOPHY

The work in this department includes History of Philosophy, Metaphysics, Ethics, and Logic, and is so arranged that the student may take a continuous course for either one or two years.

The courses are planned to meet the needs of those who make philosophy their specialty, and also of those who desire an acquaintance with the subject as a means of general culture. It is the constant aim to emphasize the meaning and interest of philosophy and the relations of its problems to the life of man. The subjects are taught by lectures, recitations, and the seminary method.

PHYSICAL TRAINING

The work of this department is offered to all students in the University. Consequently the department properly belongs in all the Colleges. A full description of its aims and scope is given farther on. [Consult the Index.]

PUBLIC LAW AND ADMINISTRATION

The courses in Public Law and Administration are planned with two purposes in view: (1) to give, in conjunction with the instruction in Economics and History, that information and training which are requisite to intelligent citizenship; and (2) to afford opportunities for advanced work to those who may desire more thorough preparation either for active political life, or preliminary to the study of law.

To meet these ends, the work is so arranged that the subject may be pursued continuously for three years. The elementary courses are given every year, while the advanced courses offered in alternate years are made to correlate in accordance with the general scheme. The topics for special investigation in the seminary course will be selected with a view to supplement the advanced work of the year.

The courses, as a whole, are intended to cover the theory of the state, its organization, and practical operation. Attention is paid to the development of political ideas and to the growth of national institutions. The comparative method is followed, wherever practicable.

PSYCHOLOGY

The aim of this department is to acquaint the student with the manifestations of mind, and the laws according to which it develops. In pursuance of this purpose, the elements of mentality as exhibited in the various animals and in early infant life are carefully investigated. The mental make-up of the defective and criminal classes is also inquired into in order that light may be thrown upon the best methods to be employed in the treatment of these classes — the best education for the defective, and the best environment for the criminal.

Special attention is given to scientific methods of child study because of the direct and important relations in which the results of such study stand to the various pedagogical

theories and to the estimate of the educational value of the different subjects taught in our common schools.

RHETORIC

The courses at present offered in Rhetoric are four, and extend over two years and one term. The object of the courses is not only to acquaint the student with the principles of rhetoric, but to teach him correctness and effectiveness in the use of English. In the first year's work a text-book is used, supplemented with lectures and a critical discussion of the written exercises. About thirty short themes and two long papers a term are required from each student. More emphasis is put upon practice than upon theory.

The second year's work is a daily theme course, and is intended to give practice in higher English composition and criticism.

A one-term course is offered in the theory and practice of argumentative discourse.

ROMANCE LANGUAGES AND LITERATURES

This department offers four years of instruction in French and one year each in Spanish and Italian. In the elementary courses the main object is to give the student correct pronunciation, grammatical knowledge, and the ability to read the languages with facility. In French 2, attention is especially directed to various phases of nineteenth century literature; effort is made to ground the student thoroughly in the modern idiom, and lectures are given upon the outlines of French literature in general. French 3 makes a special study of the masterpieces of the seventeenth century. Ability to understand readily spoken French is requisite for admission to this course. The subject of French 4 is literature and society in the eighteenth century. A graduate course is offered in Old French; some of the more important texts are studied, and attention is given to the origins of the language.

SOCIOLOGY

(See Economics in the philosophical group in the College of Science, and courses 6, 7 and 7a in the "General Descrip-

tion of Courses." See also, for allied courses, Anthropology, Anthropometry, and Psychology, courses 5 and 6.)

SPANISH

(See Romance Languages.)

COLLEGE OF ENGINEERING

FACULTY

ANDREW S. DRAPER, LL.D., President.
N. CLIFFORD RICKER, M. ARCH., DEAN, Architecture.
THOMAS J. BURRILL, PH.D., Botany.
SAMUEL W. SHATTUCK, C.E., Mathematics.
IRA O. BAKER, C.E., Civil Engineering.
CHARLES W. ROLFE, M.S., Geology.
ARTHUR N. TALBOT, C.E., Municipal and Sanitary Engineering; Mechanics.
ARTHUR W. PALMER, SC.D., Chemistry.
FRANK F. FREDERICK, Art and Design.
SAMUEL W. PARR, M.S., Applied Chemistry.
DANIEL K. DODGE, PH.D., English Language and Literature.
LESTER P. BRECKENRIDGE, PH.B., Mechanical Engineering.
DANIEL H. BRUSH, CAPTAIN U. S. A., Military Science.
ALBERT P. CARMAN, SC.D., Physics and Electrical Engineering.
GEORGE W. MYERS, PH.D., Mathematics and Astronomy.
EDGAR J TOWNSEND, PH.M., Mathematics.
JAMES M. WHITE, B.S., Architecture.
KATHARINE MERRILL, A.B., English.
WILLIAM H. VAN DERVOORT, M.E., Mechanical Engineering.
WILLIAM D. PENCE, C.E., SECRETARY; Civil Engineering.
HARRY S. GRINDLEY, SC.D., Chemistry.
T. ARKLE CLARK, B.L., Rhetoric.
HERMAN S PIATT, A.M., French (on leave).
BERNARD V. SWENSON, B.S., Electrical Engineering.
FRED A. SAGER, B.S., Physics.
WILLIAM ESTY, A. M., Electrical Engineering.
CYRUS D. MCLANE, B.S., Architecture; Mechanics.
JAMES D. PHILLIPS, B.S., General Engineering Drawing.
RALPH P. SMITH, PH.B., German.
HELEN E. BUTTERFIELD, M.L., Rhetoric.

Robert A. Wood, M.E., Mechanical Engineering.
George A. Goodenough, B.S., Mechanical Engineering.
Oscar Quick, A.M., Physics.
Edward J. Lake, B.S., Free-Hand Drawing.
Seth. J. Temple, Ph.B., Architecture.
George W. Schmidt, A.M., German.
Jeremiah G. Mosier, B.S., Geology.
Robert C. Vial, B.S., General Engineering Drawing.
Milo S. Ketchum, B.S., Civil Engineering.
Paul Chipman, B.S., Theoretical and Applied Mechanics.
Arthur S. Patterson, Ph.B., French.
David H. Carnahan, A.B., French.
William C. Brenke, B.S., Mathematics.
Cyril B. Clark, Machine Shop.
Albert R. Curtiss, Wood Shop.
Henry Jones, Forge Shop.
Joseph H. Wilson, Foundry.
James H. McKee, B.S., Fellow, Mechanical Engineering.
Walter G. Campbell, B.S., Fellow, Electrical Engineering.
George F. Anderson, Military.

AIMS AND SCOPE

The purpose of the College of Engineering is thoroughly to educate engineers and architects for their future professional courses. Its aim is therefore twofold—general and technical. A considerable proportion of the course of study is devoted to general and literary work, since a graduate is expected now to arrange his ideas in clear order, and to write or speak effectively. Professional success depends upon this power far more than is commonly supposed.

There is an ever increasing fund of general and scientific knowledge with which every educated man is expected to be conversant, if he desires to retain the esteem of his associates and clients. Scarcely a science is not at some time useful to the engineer, and some of them, like mathematics or physics, are so intimately interwoven with the different branches of technical knowledge as to be practically indispensable. Much of the most valuable material of these sciences is yet locked up in foreign languages, and these must be acquired by patient study and practice.

It might appear that this general training would be suffi-

cient to absorb the entire attention of the student during his whole course, but not less than one-half his time must be given to purely technical training, and to the acquirement of a professional capital, or stock of information and knowledge of details.

Engineering knowledge must be fresh to be valuable, since ideas and methods are quickly supplanted by improved ones, and become useless except as mile-stones of progress. Consequently the most valuable part of this professional knowledge can never be crystalized in text-books, but must be drawn from the mental stores of the instructor.

METHODS OF INSTRUCTION

Whenever suitable text-books can be found, they are employed because their use saves much time in acquiring facts and data, and because such books become doubly valuable for later reference, when enriched by notes and additions. But to arouse most fully the enthusiasm of the student, discussions and formal lectures are necessary, and they must be fully illustrated by sketches, diagrams, drawings, and photographs of executed work. These are frequently used in the advanced classes, partly because the deficiency of text-books is there greatest. Additional courses of extended reading are indicated by references to the University library, so that each student may enjoy the greatest possible benefit from the course of instruction. In all courses of study offered by this College, drawing, in its manifold forms and uses, is made a special feature, both in its application and its modes of execution.

EQUIPMENT

The equipment of the various departments is described under appropriate heads. In addition to this, the College owns a good reference library and some valuable apparatus of a general character. The most important portion consists of a collection of machines and apparatus for abbreviating computations, and especially for use in the calculation of tables. The principal instruments are described below.

(1) A Thomas ten-place arithmometer, the largest size manufactured, imported especially for the University, and giving products of numbers to twenty places. (2) Two

Thacher's computing scales for performing multiplication, division, squaring, and extraction of square root. (3) An Amsler's polar planimeter for measuring areas of figures of any form, and employed principally in graphic statics, or in measuring indicator diagrams. (4) A Coradi's rolling planimeter of largest size and a Coradi's polar planimeter for accurate use. (5) An Amsler's integrator for obtaining area, static moment, and moment of inertia of plane figures, especially of sections of columns, beams, etc. (6) A Coradi's pantagraph of best construction for the reduction of drawings and maps. (7) Various computing machines, including Boucher's calculator, Ram's slide rules, duplex slide rule, Webb's adder, the ribbon adder, etc. (8) Grant's computing machine.

DESCRIPTION OF DEPARTMENTS

ARCHITECTURE

The department of architecture and architectural engineering occupies nearly the entire upper story of Engineering Hall, thereby securing drawing rooms lighted by skylights, convenient class rooms, cabinet, museum, and studies.

INSTRUCTION

The course of study in architecture prepares graduates for professional work as architects, draftsmen, and superintendents of construction. The scientific principles of construction and its practical details, drawing applied to all purposes, the principles of design and their application to the planning and designing of buildings, are therefore made especially prominent in the course of instruction. Great attention is also devoted to the history and esthetics of architecture.

EQUIPMENT

A large collection of casts of ornament from Spain and from Germany are jointly used by the departments of architecture and of art. Models of ceilings, roof trusses, stairs, joints in woodwork, with a large number of specimens of stone, terra cotta, moulded bricks, etc., are among the architectural collections, together with an interesting group of Norwegian, Indian, and Japanese art works. A series of work-

ing drawings of buildings designed by noted architects is placed in the architectural cabinet for convenient reference.

A fine collection of 20,000 engravings, photographs, and photoprints, mounted on cards eleven by fourteen inches, is placed in the drawing rooms, classified according to the Dewey decimal system, for use in construction, history of architecture, and designing, and forms a most valuable working library for draftsmen and designers.

An electric arc lantern is permanently placed in a special lecture room with stepped floor. For use with it, there are 2,500 lantern slides, illustrating the history of architecture, including Richardson's best work, and American houses and club houses.

A good number of the latest and best American, English, French, and German architectural works is to be found in the libraries of the University and of the department.

Apparatus is provided for surveying, for making tests in heating and ventilation, and for making photographs and lantern slides.

The department also possesses a large collection of working drawings, from the offices of noted architects, of residences, offices, United States buildings, and especially of the more important structures of the World's Columbian Exposition.

COURSE OF INSTRUCTION

Required for Degree of B. S. in Architecture

First Year

1. Advanced Algebra (Math. 2); Elements of Drafting (Drawing, Gen. Eng'g 1); Free-Hand Drawing or Modeling (Arch. 20 or 21); French 5, or German 5, or English 1, 2; Military 1, 2.

2. Trigonometry and Advanced Algebra (Math. 2 and 4); Descriptive Geometry (Drawing, Gen. Eng'g 2); Free-Hand Drawing or Water Color (Arch. 20 or 21); French 5, or German 5, or English 1, 2; Military 1, 2.

3. Analytical Geometry (Math. 6); Lettering and Sketching (Drawing, Gen. Eng'g 3, 4); Architectural Drawing (Arch. 8); French 5, or German 5, or English 1, 2; Military 2.

Second Year

1. Applied Mechanics (Theo. and App. Mech. 4); Wood Construction (Arch. 2); Physics 1, 3; Architectural Drawing (Arch. 9); Rhetoric 2; Military 2.

2. Strength of Materials (Theo. and App. Mech. 5); Stone, Brick, and Metal Construction (Arch. 3); Physics 1 3; Architectural Drawing (Arch. 9); Rhetoric 2; Military 2.

3. Sanitary Construction (Arch. 4); Free-Hand Drawing or Sketching (Arch. 20 or 21); Physics 1, 3; Architectural Drawing (Arch. 9); Rhetoric 2; Military 2.

Third Year

1. History of Architecture (Arch. 6); Architectural Seminary (Arch. 11); Architectural Designing (Arch. 17); Chemistry 1; Architectural Drawing (Arch. 9).

2. History of Architecture (Arch. 6); Architectural Seminary (Arch. 11); Architectural Perspective (Arch. 14); Requirements and Planning of Buildings (Arch. 15); Architectural Drawing (Arch. 9).

3. History of Architecture (Arch. 7); Architectural Seminary (Arch. 11; Roofs (Arch. 5); Architectural Composition (Arch. 18); Architectural Drawing (Arch. 9).

Fourth Year

1. Heating and Ventilation (Arch. 13): Architectural Designing (Arch. 16); Renaissance Design (Arch. 22); Thesis.

2. Superintendence, Estimates, and Specifications (Arch. 12); Gothic Design (Arch. 23); Romanesque Design (Arch. 24)*; Thesis.

3. Surveying (Civil Eng'g 10); Composition of Ornament (Arch. 25); Thesis.

ARCHITECTURAL ENGINEERING

This course of study prepares graduates for professional employment as architects, structural designers and computers, as well as superintendents of construction. It is intended for students who prefer the structural and mathematical side of the profession to its artistic side, and who desire to pursue the full engineering course in mathematics, and to acquire a thorough knowledge of the iron and steel construction now employed in buildings. It differs from the architectural course principally in the addition of a second year of mathematics; in the substitution of a year of civil engineering study in masonry design, bridge analysis and design, for the year of free-hand drawing, and in the devotion of considerably less time to architectural drawing and designing.

*A second term in Arch. 22 will be accepted in lieu of Arch. 23 or Arch. 24

COURSE OF INSTRUCTION

Required for Degree of B. S. in Architectural Engineering

First Year

1. Advanced Algebra (Math. 2); Elements of Drafting (Drawing, Gen. Eng'g 1); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 1, 2.

2. Trigonometry and Advanced Algebra (Math. 2 and 4); Descriptive Geometry (Drawing, Gen. Eng'g 2); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 1, 2.

3. Analytical Geometry (Math. 6); Lettering and Sketching (Drawing, Gen. Eng'g 3, 4); Architectural Drawing (Arch. 8); French 5, or German 5, or English 1, 2; Military 2.

Second Year

1. Differential Calculus (Math. 7); Wood Construction (Arch. 2); Physics 1, 2; Architectural Drawing (Arch. 9); Rhetoric 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); Stone, Brick, and Metal Construction (Arch. 3); Physics 1 and 3; Architectural Drawing (Arch. 9); Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9); Sanitary Construction (Arch. 4); Physics 1 and 3; Architectural Drawing (Arch. 9); Rhetoric 2; Military 2.

Third Year

1. Analytical Mechanics (Theo. and Appl'd Mech. 1); History of Architecture (Arch. 6); Architectural Drawing (Arch. 9); Architectural Seminary (Arch 11); Chemistry 1.

2. Resistance of Materials (Theo. and Appl'd Mech. 2); History of Architecture (Arch. 6); Architectural Drawing (Arch. 9); Architectural Seminary (Arch. 11); Chemistry 16.

3. Hydraulics (Theo. and Appl'd Mech. 3); Roofs (Arch. 5); Dynamo-Electric Machinery (Elect. Eng'g 2); Architectural Drawing (Arch. 9).

Fourth Year

1. Bridge Analysis (Civil Eng'g 12); Architectural Designing (Arch. 16); Heating and Ventilation (Arch. 13); Thesis.

2. Bridge Details (Civil Eng'g 13); Superintendence, Estimates, and Specifications (Arch. 12); Thesis.

3. Bridge Design (Civil Eng'g 14); Surveying (Civil Eng'g 10); Architectural Engineering (Arch. 19); Thesis.

CIVIL ENGINEERING

The design in this department is to furnish a course of theoretical instruction, accompanied and illustrated by a large amount of practice, which will enable the student to enter intelligently upon the various and important duties of the civil engineer. While the instruction aims to be practical by giving the student information and practice directly applicable in his future professional work, the prime object is the development of the mental faculties. The power to acquire information, and the ability to use it, is held to be of far greater value than any amount of so-called practical knowledge.

EQUIPMENT

This department has an extensive equipment of compasses, engineers' transits, solar transits, levels—ordinary and precise—plane tables, barometers, etc. An Observatory is provided with the instruments necessary in determining latitude, time, and azimuth. The equipment includes two astronomical transits, a 10-inch altazimuth reading to seconds, two clocks, two chronographs, three chronometers, two sextants, and five isolated masonry piers. For the lecture room, the department is provided with full-size joints of an actual railroad bridge, sections of columns, eye-bars, etc., and a large collection of lithographs, photographs, and blue prints of bridges and buildings.

COURSE OF INSTRUCTION

Required for the Degree of B. S. in Civil Engineering

First Year

1. Advanced Algebra (Math. 2); Elements of Drafting (Drawing, Gen. Eng'g 1); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1 and 2; Military 1 and 2.

2. Trigonometry and Advanced Algebra (Math. 2 and 4); Descriptive Geometry (Drawing, Gen. Eng'g 2); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 1, 2.

3. Analytical Geometry (Math. 6); Lettering and Sketching (Drawing, Gen. Eng'g 3 and 4); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 2.

Second Year

1. Differential Calculus (Math. 7); Land Surveying (Civil Eng'g 1); Physics 1 and 3; Rhetoric 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); Drawing and Surveying (Civil Eng'g 2 and 3); Physics 1 and 3; Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9); Drawing and Surveying (Civil Eng'g 2 and 3); Physics 1 and 3; Rhetoric 2; Military 2.

Third Year

1. Analytical Mechanics (Theo. and Appl'd Mech 1); Railroad Engineering (Civil Eng'g 4); Chemistry 1.

2. Resistance of Materials (Theo. and Appl'd Mech. 2); Railroad Engineering (Civil Eng'g 4); Road Engineering (Municipal and San. Eng'g 1); Steam Engines (Mech. Eng'g 16); Steam Boilers (Mech. Eng'g 17).

3. Hydraulics (Theo. and Appl'd Mech. 3); Descriptive Astronomy (Astronomy 4a); Roofs (Arch. 5).

Fourth Year

1. Masonry Construction (Civil Eng'g 5); Bridge Analysis (Civil Eng'g 12); Water Supply Engineering (Mun. and San. Eng'g 2); Thesis.

2. Bridge Details (Civil Eng'g 13; Sewerage (Mun. and San. Eng'g 3), or Railroad Structures (Civil Eng'g 17); Tunneling (Civil Eng'g 15); Geodesy (Civil Eng'g 6); Thesis.

3. Bridge Design (Civil Eng'g 14); Geology 3; Practical Astronomy (Astronomy 6); Engineering Contracts and Specifications (Civil Eng'g 16); Thesis.

ELECTRICAL ENGINEERING

INSTRUCTION

This is a course of theoretical and applied electricity. It extends through four years. The first two years are substantially the same as in the other engineering courses. In the last two years the course includes the fundamental subjects in theoretical and applied mechanics and steam engineering, but a large part of the time is given to courses in electricity and its applications. The features of the instruction are the facilities offered for laboratory work by the student, supplementary to all class room work on electrical theory and electrical machinery; the work done in calculating, designing, and making working drawings of electrical apparatus; the senior thesis requirements and facilities offered for original work; the weekly seminary, where the instructors and students meet in the department reading room and dis-

cuss the main articles in the leading American, English, French, and German technical journals.

EQUIPMENT

The class rooms, drafting rooms, seminary rooms, laboratory for more exact electrical measurements, studies and offices are in Engineering Hall. The dynamo-laboratory, battery room, photometer room, and work shop are in University Hall.

The department is fortunate in having the six large pier-rooms of the physics department for the more exact electrical and magnetic measurements. These rooms with their equipment are described in more detail under the equipment of the physics department. The drafting and seminary rooms are well lighted and supplied with every convenience. The seminary room is accessible to members of the upper classes at all times. It contains files of all the leading journals of theoretical and applied electricity in English, French, and German, besides a department reference library.

The dynamo laboratory, which is supplied with power from a sixty horse-power steam engine, is equipped with various types of direct current dynamos and motors, alternators and transformers, with apparatus and every convenience for making complete tests. Included in this equipment is a 300-light Thomson-Houston alternator with exciter, switch-board appliances, and a large number of transformers of various makes; also Brush and Thomson-Houston arc light machines, Thomson-Houston and Edison incandescent machines, and 500-volt generators, several Jenny motors, and two small Westinghouse single phase machines. The equipment includes a large number of Weston voltmeters, ammeters, and wattmeters, thus giving facilities for the accurate determination of E. M. F., current, and power in both direct and alternate current circuits. In addition to these are various other standard instruments, such as a number of Whitney and Hoyt ammeters, Kelvin balances, and electrostatic voltmeters, several different makes of recording and indicating wattmeters, electro-dynamometers, electrometers, hysteresis meters, condensers, inductive and non-inductive resistances, lamp and water rheostats, Brackett cradle dynamometer, tachometers, revolving contact makers, and other

devices and appliances which are essential to the thorough experimental study of direct and alternating currents.

The photometer room is supplied with an electric-light photometer, types of incandescent and of direct and alternating current arc lamps, and various conveniences for making electric light tests.

The battery room contains a collection of primary cells and a large battery of secondary cells, fitted with switchboard and testing conveniences.

The work shop is supplied with an engine lathe, a speed lathe, grinder, milling machine, etc., and a line of fine tools. An electric motor furnishes power for this machinery. The services of an experienced mechanic enable the department to manufacture special apparatus as required.

COURSE OF INSTRUCTION

Required for the Degree of B. S. in Electrical Engineering.

First Year

1. Advanced Algebra (Math. 2); Elements of Drafting (Drawing, Gen. Eng'g 1); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 1, 2.

2. Trigonometry and Advanced Algebra (Math. 2 and 4); Descriptive Geometry (Drawing, Gen. Eng'g 2); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 1, 2.

3. Analytical Geometry (Math. 6); Lettering and Sketching (Drawing, Gen. Eng'g 3, 4); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 2.

Second Year

1. Differential Calculus (Math. 7); Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1 and 3; Rhetoric 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1 and 3; Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9); Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1 and 3; Rhetoric 2; Military 2.

Third Year

1. Analytical Mechanics (Theo. and Appl'd Mech. 1): Mechanism (Mech. Eng'g 5); Chemistry 1; Electrical and Magnetic Measurements (Physics 4).

2. Resistance of Materials (Theo and Appl'd Mech. 2); Steam Engines (Mech. Eng'g 16); Steam Boilers (Mech. Eng'g 17); Electrical and Magnetic Measurements (Physics 4); Elective (1 credit for winter and spring terms together), Mathematics 16, or Chemistry 3a, or Civil Engineering 10.

3. Hydraulics (Theo. and Appl'd Mech. 3); Mechanical Engineering Laboratory (Mech. Eng'g 13); Electrical Measurements (Physics 4); Elements of Dynamo Machinery (Elect. Eng'g 11); Elective (same as winter term).

Fourth Year

1. Thermodynamics (Mech. Eng'g 7); Steam Engine Design (Mech. Eng'g 14); Dynamo-Electric Machinery (Elect. Eng'g 3a); Electrical Design (Elect. Eng'g 3b); Seminary (Elect. Eng'g 10); Thesis.

2. Alternating Currents and Alternating Current Machinery (Elect. Eng'g 4a); Electrical Design (Elect. Eng'g 4b); Photometry (Elect. Eng'g 5); Electric Lighting Plants (Elect. Eng'g 8); Seminary (Elect. Eng'g 10); Thesis.

3. Alternating Currents and Alternating Current Machinery (Elect. Eng'g 4a); Electrical Design (Elect. Eng'g 4b); Eléctrical Transmission of Power (Elect. Eng'g 9); Telegraphy and Telephony (Elect. Eng'g 6); Seminary (Elect. Eng'g 10); Thesis.

MECHANICAL ENGINEERING

It is the object of this course to give the student a thorough training in the theoretical principles underlying the science of machines and mechanics, and at the same time to enable him to become practically familiar with some of the numerous applications of these principles.

EQUIPMENT

The equipment of this department is arranged for work under three heads—class and drawing-room work, mechanical engineering laboratory work, and shop practice.

The *drawing rooms* are equipped with modern desks, boards, filing cabinets, card indexes, reference books, catalogues, odontographs, gear charts, tables, etc. In the cabinet rooms are kinematic models and sectioned steam specialties, many of which were donated by the manufacturers.

The *mechanical engineering laboratory* is in the Engineering Laboratory. It contains engines, boilers, pumps, a surface condenser, and a large assortment of indicators,

gauges, scales, thermometers, dynamometers, calorimeters, reducing motions, planimeters, measuring tanks, and apparatus for the calibration of instruments. The engines may be run either with or without a condenser, with plain slide or expansion valves, or with automatic or throttling governors. Power is transmitted from the engines in this laboratory to the machine shop by a thirty horse-power rope drive. Water is brought to the laboratory through a 2-inch main, furnishing a supply for condensers and boiled feed.

The heating and power plant of the University contains nine boilers: two Root, one Sterling, four horizontal tubular, and two Babcock & Wilcox, aggregating eight hundred horse-power. These furnish additional opportunity for experiment. Tests are also made at the power plants, pumping station, and factories of the two cities.

The machine shop, foundry, and forge shop are located in Machinery Building.

The *machine shop* contains one twenty-seven-inch by twelve-foot bed F. E. Reed & Co. engine lathe; twelve engine lathes of from twelve- to twenty-inch swing; two ten-inch speed lathes; one centering lathe; one fifteen-inch Gould & Eberhardt shaper; one fifteen-inch Hendey shaper; one No. 3 Brown & Sharpe plain milling machine; one Brainard universal milling machine; one twenty- by twenty-inch by five-foot Putnam planer; one thirty- by thirty-inch by eight-foot G. A. Gray & Co. planer; one No. 2 improved Brown & Sharpe universal grinding machine; one Brown & Sharpe cutter and reamer grinder; one twenty-four-inch drill press; one twenty-inch drill press; one sensitive drill press; one water emery tool grinder; one center grinding machine; one Stover power hack saw; one Worcester twist drill grinder; complete set of United States standard taps and dies; drills, arbors; reamers, gear and milling cutters, caliper gauges, calipers, scales, and other small tools.

The *wood shop* occupies the second floor of Engineering Laboratory, and contains twenty-six improved wood-working benches, fourteen of which are fitted with Wyman and Gordon patent vises; one thirty-four-inch F. H. Clement & Co. band saw; one thirty-six-inch Yerkes & Finan band saw; one twenty-inch Clement & Co. wood planer; one J. A. Fay & Co. jig-saw; one J. A. Fay & Co. jointer; eight ten-

inch wood lathes; one eighteen-inch pattern-maker's lathe, one No. 4 E. Fox trimmer, together with a complete equipment of small tools.

The *foundry* occupies a room 48 by 48 feet in Machinery Building, and is equipped with a twenty-four-inch Whiting patent cupola, a core oven, and the necessary sand, ladles, and flasks for making castings. A No. 7 Buffalo steel pressure fan furnishes blast for the cupola.

The *forge shop* occupies a room 36 by 48 feet in Machinery Building, and contains ten latest improved Buffalo down-draft forges. Blast is furnished these forges by a No. 5 Sturtevant pressure blower, and all gases of combustion are exhausted under ground by means of a No. 9 Sturtevant exhaust fan. The shop is also equipped with all necessary small tools.

COURSE OF INSTRUCTION

Required for the Degree of B. S. in Mechanical Engineering

First Year

1. Advanced Algebra (Math. 2); Elements of Drafting (Drawing, Gen. Eng'g 1); French 5, or German 5, or English 1 and 2; Shop Practice (Mech. Eng'g 1); Military 1, 2.

2. Trigonometry and Advanced Algebra (Math. 2 and 4); Descriptive Geometry (Drawing, Gen. Eng'g 2); French 5, or German 5, or English 1 and 2; Shop Practice (Mech. Eng'g 1); Military 1, 2.

3. Analytical Geometry (Math. 6); Lettering and Sketching (Drawing, Gen. Eng'g 3 and 4); French 5, or German 5, or English 1 and 2; Shop Practice (Mech. Eng'g 1); Military 2.

Second Year

1. Differential Calculus (Math. 7); Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1 and 3; Rhetoric 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1 and 3; Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9); Elements of Machine Design (Mech Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1 and 3; Rhetoric 2; Military 2.

Third Year

1. Analytical Mechanics (Theo. and Appl'd Mech. 1), Mechanism (Mech. Eng'g 5); Chemistry 1; Power Measurements (Mech. Eng'g 3).

2. Resistance of Materials (Theo. and Appl'd Mech. 2); Steam Engines (Mech. Eng'g 16); Steam Boilers (Mech. Eng'g 17); Chemistry 16; Power Measurements (Mech. Eng'g 3).

3. Hydraulics (Theo. and Appl'd Mech. 3); Electrical Engineering (Elect. Eng'g 1); Surveying (Civil Eng'g 10); Power Measurements (Mech. Eng'g 3).

Fourth Year

1. Thermodynamics (Mech. Eng'g 7); High Speed Steam Engine Design (Mech. Eng'g 14); Valve Gears (Mech. Eng'g 15); Advanced Mechanical Laboratory (Mech. Eng'g 12); Seminary (Mech. Eng'g 19); Thesis.

2. Mechanics of Machinery (Mech. Eng'g 8); Graphical Statics of Mechanism (Mech. Eng'g 18); Advanced Designing (Mech. Eng'g 9); Advanced Mechanical Laboratory (Mech. Eng'g 12); Seminary (Mech. Eng'g 19); Thesis.

3. Mechanics of Machinery (Mech Eng'g 8): Advanced Designing (Mech. Eng'g 9); Estimates (Mech. Eng'g 10); Seminary (Mech. Eng'g 19); Thesis.

MUNICIPAL AND SANITARY ENGINEERING

This course is designed for students desiring to make a specialty of city engineering work. It prepares for the varied duties of engineer of the department of public works of cities and includes instruction in modern methods of sanitation of cities.

INSTRUCTION

Instruction is given by lectures, by text-book and seminary work, and by field, laboratory, and drafting work. The methods of training are intended to develop power to take up and solve new problems connected with municipal public works, as well as to design and to superintend the ordinary constructions. Surveying, structural materials, and structural design are taught as in the civil engineering course. Chemistry, botany, and bacteriology, so far as necessary to a comprehension of the questions involved in water supply and sewage disposal, are given. The facilities for this instruction are very good. The principles of the generation and transmission of electrical energy are given. Road engineering, water supply engineering, and sewerage receive special attention. A collection of drawings, plans, photographs, etc., has been added to the equipment.

COURSE OF INSTRUCTION

Required for Degree of B. S. in Municipal and Sanitary Engineering.

First Year

1. Advanced Algebra (Math. 2); Elements of Drafting (Drawing, Gen. Eng'g 1); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 1, 2.

2. Trigonometry and Advanced Algebra (Math. 2 and 4); Descriptive Geometry (Drawing, Gen. Eng'g 2); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 1, 2.

3. Analytical Geometry (Math. 6); Lettering and Sketching (Drawing, Gen. Eng'g 3 and 4); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1 and 2; Military 2.

Second Year

1. Differential Calculus (Math. 7); Land Surveying (Civil Eng'g 1); Physics 1 and 3; Rhetoric 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); Drawing and Surveying (Civil Eng'g 2 and 3); Physics 1 and 3; Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9); Drawing and Surveying (Civil Eng'g 2 and 3); Physics 1 and 3; Rhetoric 2; Military 2.

Third Year

1. Analytical Mechanics (Theo. and Appl'd Mech. 1); Railroad Engineering (Civil Eng'g 4); Chemistry 1.

2. Resistance of Materials (Theo. and Appl'd Mech. 2); Road Engineering (Mun. and San. Eng'g 1); Railroad Engineering (Civil Eng'g 4); Bacteriology (Mun. and San. Eng'g 5a); Steam Engines and Boilers (Mech. Eng'g 16).

3. Hydraulics (Theo. and Appl'd Mech. 3); Roofs (Arch. 5); Practical Electrical Engineering (Elect. Eng'g 1).

Fourth Year

1. Water Supply Engineering (Mun. and San. Eng'g 2); Masonry Construction (Civil Eng'g 5); Bridge Analysis (Civil Eng'g 12); Thesis.

2. Sewerage (Mun. and San. Eng'g 3); Bridge Details (Civil Eng'g 13); Chemistry 3a; Thesis.

3. Water Purification, Sewage Disposal, and General Sanitation (Mun. and San. Eng'g 6); Engineering Contracts and Specifications (Civil Eng'g 16); Mechanical Engineering Laboratory (Mech. Eng'g 13); Chemistry 20; Thesis.

PHYSICS

The courses in this department are designed to furnish the student who intends to follow the profession of engi-

neering, science teaching, or research in physical science, with such a knowledge of the phenomena and laws of physics as may be of greatest use in his chosen calling.

EQUIPMENT

The rooms devoted to physics are in Engineering Hall. They include a large lecture room and cabinet, a large general laboratory and cabinet, several small laboratories, a constant-temperature room, a battery room, a work shop, and several private studies, laboratories, and offices.

The *lecture room* is in the form of an amphitheater, and is furnished with opera chairs provided with tablet arms. Piers at the lecture desk and in the center of the room make demonstrations with the more delicate apparatus possible. A permanent screen and rolling blinds, operated by a motor, facilitate illustration by lantern. The cabinet rooms adjoining the lecture room are supplied with apparatus suitable for illustration and demonstration, and are provided with conveniences for preparing apparatus for lectures.

The general laboratory is a room sixty feet square, and is well lighted and ventilated. It is supplied with tables, shelves, and sinks, arranged for general experimental work. The cabinet room adjoining this laboratory contains the apparatus designed for elementary experimental work, and also a line of high-grade apparatus intended for advanced experimental work and research.

The *small laboratories*, six in number, are on the first floor, and are abundantly provided with masonry piers, wall shelves, sinks, dark curtains, etc. These rooms are now equipped with apparatus for electrical measurements.

The *constant-temperature* room is on the first floor. It is isolated from the surrounding space by double masonry walls and double doors. It is arranged for such experiments as require a low, uniform temperature.

The department shares with the electrical engineering department the work shop in University Hall. This gives the department special facilities for preparing special apparatus for advanced and original investigations.

In addition to the preceding, there are a number of private studies and laboratories for the use of advanced students and instructors.

Electrical current is supplied to all the laboratories from the battery room, and also from the dynamo laboratory in University Hall.

THEORETICAL AND APPLIED MECHANICS

The courses in theoretical and applied mechanics are designed to meet the needs of students of the College of Engineering.

EQUIPMENT

The Laboratory of Applied Mechanics is located in Engineering Laboratory. It comprises the materials laboratory and the hydraulic laboratory.

The *materials laboratory* has an Olsen testing machine of 200,000 pounds capacity, arranged to test beams twenty feet long; a Riehle testing machine of 100,000 pounds capacity; a smaller apparatus for testing beams, a Riehle wire-testing machine, extensometers, and deflectometers, a stone-grinding machine, a rattler for abrasion tests of stone and brick, with other apparatus for making all necessary measurements and observations, etc. The laboratory is fitted up as a working laboratory where students may acquire such practice in experimental work as engineers are called upon to perform, as well as for the purpose of illustrating principles, and also for use in original investigation.

The *hydraulic laboratory* contains a steel standpipe connected with city water supply and having several openings, a steam pump, tanks, pits, scales, pressure gauges, hook gauges, meters, including a Venturi meter, water meter, and other apparatus for experiments with orifices, tubes, weirs, pipes, hose, and nozzles. Experiments are made in connection with the regular class instruction.

COLLEGE OF SCIENCE

FACULTY

ANDREW S. DRAPER, LL.D., PRESIDENT.
STEPHEN A. FORBES, PH.D., DEAN, Zoölogy.
THOMAS J. BURRILL, PH.D., Botany and Horticulture.
SAMUEL W. SHATTUCK, C.E., Mathematics.
CHARLES W. ROLFE, M.S., Geology.
DONALD McINTOSH, V.S., Materia Medica.
ARTHUR W. PALMER, Sc.D., Chemistry.
FRANK F. FREDERICK, Art and Design.
SAMUEL W. PARR, M.S., Applied Chemistry.
DAVID KINLEY, PH D., Economics and Sociology.
DANIEL H. BRUSH, Captain 17th Infantry, U.S.A., Military Science and Tactics.
ARNOLD TOMPKINS, PH.D., Pedagogy.
ALBERT P. CARMAN, Sc.D., Physics.
GEORGE W. MYERS, PH.D., Astronomy and Mathematics.
HENRY E. SUMMERS, B.S., Human Physiology and Vertebrate Anatomy.
EDGAR J TOWNSEND, PH.M., Mathematics.
EVARTS B. GREENE, PH.D., History.
KATHARINE MERRILL, A.B., English.
WILLIAM O. KROHN, PH.D., Psychology.
HARRY S. GRINDLEY, Sc.D., Chemistry.
T. ARKLE CLARK, B.L., Rhetoric.
HERMAN S PIATT, A.M., French.
ARTHUR H. DANIELS, PH.D., Philosophy.
CHARLES W. TOOKE, A.M., Public Law and Administration.
FRED A. SAGER, B.S., Physics.
HENRY H. EVERETT, Physical Training.
FRANK SMITH, A.M., SECRETARY, Zoölogy.
JOHN E. McGILVREY, A.B., Pedagogy.
GEORGE H. ALDEN, PH.D., History.

Ralph P. Smith, Ph.B., German.
Helen E. Butterfield, M.L., Rhetoric.
Oscar Quick, A.M., Physics.
Edward J. Lake, B.S., Free-Hand Drawing.
Ella H. Morrison, Physical Training for Women.
George A Huff, Jr., Coach of Athletic Teams.
Carlton R. Rose, Ph.M , Chemistry.
George W. Schmidt, A.M., German.
Jeremiah G. Mosier, B.S., Geology.
Charles F. Hottes, M.S., Botany.
Clendon V. Millar, M.S., Chemistry.
Arthur S. Patterson, Ph.B., French.
David H. Carnahan, A.B., French.
Harry Keeler, B.S., Chemistry.
William C. Brenke, B.S., Mathematics.
George F. Anderson, Military Science.

AIMS AND SCOPE

The College of Science is based upon the idea that the methods of science and the branches of study to which those methods are applicable present a subject matter and a discipline ample for the purposes of a liberal education, and that an education so derived differs materially in character and value from one whose sources are mainly literary. This College is distinguished in general from the technical colleges of the University by the fact that its choice of subjects is not limited by practical ends, and from the College of Literature and Arts by the predominance, in its courses and requirements, of the strictly scientific subjects. It is assimilated to the latter, however, by the liberal elections from the literary courses permitted to students who have satisfied its demands as to scientific work, and by the special courses in science open to election by students from the companion college.

It affords an opportunity for the study of the natural, physical, mathematical, and mental sciences, and of economic, sociological, and philosophical subjects, either as specialties or as the substance of a general education. The candidate for graduation may take a year each in any four of the principal subjects of this College, with a considerable amount of language, literature, and general study; he may concentrate his major work on any one of the several subjects in which major

courses are offered; or he may adopt any program of concentration of his major work intermediate between these extremes. The subjects presented in this College are accordingly arranged in four groups—chemical and physical, mathematical, natural science, and philosophical—each characterized by the predominant importance and development of the subjects indicated by its name. The studies of each group are again divided into required and elective subjects, and the latter are further subdivided into three lists, A, B, and C. All the required subjects are necessary to graduation in the group of studies specified; those of the elective lists A and B are open to election, restricted only by certain general requirements, varying in the different groups, regarding the amount and distribution of the work to be done on them; and those of list C are open to election unconditionally.

It is the purpose of this system of classification and requirement to permit large liberty of choice with respect both to main lines of study and to associated or secondary subjects, and at the same time so to guide the student's elections that his course of study shall always contain a central core or axis of closely articulated major work. Preference is further given by this means to those minor subjects most important because of their relations to the major work elected.

The only undergraduate degree given in this College is that of Bachelor of Science. Forty full term-credits for University studies are required for graduation, three of which may be earned by investigation work, the results of which are to be presented in a final thesis. Credit will be given for fractions of courses of instruction in exceptional cases only, by vote of the College faculty.

EQUIPMENT

Laboratories.—The College of Science occupies three of the University buildings—the Chemical Laboratory, Natural History Hall and the Astronomical Observatory—together with several rooms in University Hall assigned to the mathematical department, and to some of the departments of the philosophical group. The Physics laboratories and lecture room are in Engineering Hall, and the natural history museum is in University Hall.

The laboratory and library facilities of this College have been acquired with primary reference to the needs of the undergraduate student, and are scarcely surpassed, for their purpose, in grade and completeness, among American universities. The graduate student likewise finds here an ample equipment, material, and opportunity for independent investigation in several departments of study, notably in those covered by the operations of the State Laboratory of Natural History and of the State Entomologist's office.

THE CHEMICAL AND PHYSICAL GROUP

AIMS

The purposes of the chemical and physical group may be distinguished as: 1, General; 2, Technological.

1. Provision is made for such students as desire to direct their attention to the purely scientific aspects of chemistry or physics, either as part of a general education or with the view of preparing themselves to become teachers of the physical sciences or investigators in the various branches of physics and pure chemistry.

2. The constantly growing demand for chemical knowledge and skill in the industrial world is here recognized and provided for. Ample opportunities are offered to those who wish to follow work along technological lines, special attention being given to the underlying chemical principles and their applications in the various industries

For those who wish to prepare along the more advanced pharmaceutical lines, opportunity is offered for preparation in a thoroughly scientific manner for the work of the investigating and manufacturing pharmacist.

EQUIPMENT FOR CHEMISTRY

Laboratories.—The chemical building is 75 by 120 feet, and three stories high, including basement. The basement contains the water survey laboratory and rooms for storage, dispensing, and for work in assaying and metallurgical chemistry. The first floor has a lecture room which seats 150; a laboratory for general chemistry and qualitative analysis, which accommodates 150 students; a large private laboratory, and a store room. The second floor has a laboratory

for quantitative analysis and organic chemistry, a balance and reading room, a room for the special operations of physical chemistry, a private laboratory, and a store room.

Apparatus.—These laboratories are amply furnished with all the modern conveniences and supplies for the various lines of work in pure and applied chemistry.

The apparatus for general use includes nineteen analytical balances of Sartorius's, Becker's and Troemner's make, a large platinum retort for making hydrofluoric acid, Geissler's mercurial air pumps, a Schmidt and Haentsch saccharimeter, Hofmann's and Lepsius's apparatus for lecture demonstrations, complete sets of apparatus for gas analysis, spectroscopes, etc.

A very important feature of the equipment consists of the chemical library which, in addition to all the modern standard chemical texts, dictionaries, and encyclopedias, includes complete sets of nearly all the more important chemical journals, especially the German and the English. The current numbers of many others are regularly received.

EQUIPMENT FOR PHYSICS

The rooms devoted to Physics are in Engineering Hall. The large lecture room is seated with opera chairs provided with tablet arms. In a cabinet adjoining are apparatus and conveniences for illustration, demonstration, and preparation for lectures. The general laboratory is equipped for general and advanced experimental work and research. The small laboratories, six in number, on the ground floor, are now equipped with apparatus for electrical measurements. The constant temperature room, also on the ground floor, has double masonry walls and double floors, and is arranged for experiments requiring a low uniform temperature. The workshop, near the small laboratories, is equipped for the manufacture and repair of apparatus. In addition to the preceding there are several private studies, laboratories and offices for the use of instructors and advanced students.

CHEMICAL COURSES

CLASSIFICATION OF SUBJECTS

Prescribed

1. *Chemical.*—General Elementary Chemistry (Chem. 1); 1 credit.
   Descriptive Inorganic Chemistry (Chem. 2); 1 credit.
   Elements of Organic Chemistry (Chem. 4); 1 credit.
   Organic Chemistry (Chem. 9); 2 credits.
   Qualitative Analysis (Chem. 3a, 3b); 2 credits.
   Quantitative Analysis (Chem. 5a, 5b); 2 credits.
   Seminary (Chem. 19); 2 credits.
2. *General.*—Advanced Algebra (Math. 1, 2); 1 credit.
   German 1, 2, 5, 6; 5 or 6 credits.*
   Military 1, 2; 2 credits.
   Physics 1, 3; 3 credits.
   Rhetoric 2; 2 credits.
   Trigonometry (Math. 3 or 4); 1 credit.

Elective

List A (Chemical)

Agricultural Chemistry (Chem. 13); 2 credits.
Chemical Technology (Chem. 6); 1 credit.
Iron and Steel Analysis (Chem. 8); 1 credit.
Industrial Chemistry (Chem. 17); 1 credit.
Metallurgy (Chem. 14); 1 credit.
Metallurgical Chemistry (Chem. 15); 1, 2, or 3 credits.
Physical Chemistry (Chem. 7); 1, 2, or 3 credits.
Proximate Organic Analysis (Chem. 21); 1 or 2 credits.
Quantitative Analysis (Chem. 5c); 1 credit.
Sanitary Analysis (Chem. 10); 1 credit.
Special Courses (Chem. 18 a, b, c, d) $\frac{1}{5}$ to $5\frac{3}{5}$ credits.
Theoretical Chemistry (Chem. 12); 1 credit.
Thesis and Investigations (Chem. 11); 2 credits.

List B (General)

Botany 6, 1; 1 or 3 credits.
Electrical Engineering 1; 1 credit.
English 1 to 9; $1\frac{1}{5}$ to 9 credits.
Greek 1 to 3; 3 credits.
Geology 4, 1; 1, 2, or 3 credits.

*This requirement may be satisfied by courses 5 and 6, or by course 6, preceded by four terms of 1 and 2.

Latin 1 to 3; 3 credits.
Mathematics 2 to 9; 3 or 4 credits.
Mechanical Engineering 1, 2, and 6; 1 or 2 credits.
Mineralogy 1, 2; 1, 2, or 3 credits.
Physics 4 to 7; 11 credits.
Physiology 4, 1; 1 or 2 credits.
Theoretical and Applied Mechanics 1 to 5; 1 to 3 credits.
Zoölogy 3, 1; 2 or 3 credits.

List C

Anthropology 1; 1 credit.
Art and Design 5; 1 credit.
Astronomy 4; 1 credit.
Botany 2; 1 credit.
Chemistry (advanced work); 1 to 3 credits.
Economics 1 to 8; 2 to 6 credits.
French 1 or 5, 2; 3 or 6 credits.
German 2; 1 credit.
History 1, 2; $1\frac{1}{5}$ to 3 credits.
Materia Medica 1; 2 credits.
Meteorology 1; $\frac{1}{2}$ credit.
Military 3.
Pedagogy 1 to 7; 3 credits.
Photography (Chem. 22); $\frac{2}{5}$ credit.
Philosophy 1 to 8; $\frac{2}{5}$ to 7 credits.
Political Science 1 to 9; $\frac{2}{5}$ to $9\frac{2}{5}$ credits.
Psychology 1 to 7, 9; 1 to 8 credits.

REQUIREMENTS FOR GRADUATION

In order to graduate in chemistry, the candidate must have completed all the required courses (25 credits), and must have at least three credits additional for subjects to be chosen from the chemical list A, of electives. For the twelve remaining credits he must choose six subjects from list B and six from lists B and C. He must make, in all, forty full term-credits, and present an acceptable thesis; or, if he graduates without a thesis, his credits must include two terms' special advanced work, assigned by the head of his department.

Special exceptions as to the required number of chemical options may be made for those who desire to prepare themselves as teachers of chemistry rather than as technical chemists.

COURSES OF INSTRUCTION BY YEARS AND TERMS

The following program of prescribed courses and chemical electives shows the terms in which the principal studies of the chemical group must be taken. The prescribed studies, which are in *italics*, must be taken also in the year and term indicated.

First Year

1. *Advanced Algebra* (Math. 1 or 2); *General Introductory Chemistry* (Chem. 1); *German* 5 or 1; *Military* 1, 2.

2. *Descriptive Inorganic Chemistry* (Chem. 2); *German* 5 or 1; *Military* 1, 2; *Advanced Algebra and Trigonometry* (Math. 2 and 4); *Qualitative Analysis* (Chem. 3a).

3. Analytical Geometry (Math. 6); *Descriptive Inorganic Chemistry* (Chem. 2); *Elements of Organic Chemistry* (Chem. 4); *German* 5 or 1; *Military* 2; *Qualitative Anaylsis* (Chem. 3b).

Second Year

1. German 2; *Military* 2; *Physics* 1, 3; *Quantitative Analysis* (Chem. 5a).

2. Physical Chemistry (Chem. 7); Agricultural Chemistry (Chem. 13); Chemical Technology (Chem. 6); *German* 6; *Military* 2; *Physics* 1, 3; *Quantitative Analysis* (Chem. 5b).

3. Physical Chemistry (Chem. 7); Agricultural Chemistry (Chem. 13); Chemical Technology (Chem. 6); *German* 6; Iron and Steel Analysis (Chem. 8); *Military* 2; Quantitative Analysis (Chem. 5c); *Physics* 1, 3.

Third Year

1. Physical Chemistry (Chem. 7); Metallurgical Chemistry (Chem. 15); Metallurgy (Chem. 14); *Rhetoric* 2; *Seminary* (Chem. 19).

2. Chemistry (Chem. 7); Metallurgical Chemistry (Chem. 15); *Organic Chemistry* (Chem. 9); Proximate Organic Analysis (Chem. 21); *Rhetoric* 2; *Seminary* (Chem. 19); Theoretical Chemistry (Chem. 12).

3. Chemistry (Chem. 7); Metallurgical Chemistry (Chem. 15); *Organic Chemistry* (Chem. 9); Proximate Organic Analysis (Chem. 21); *Rhetoric* 2; *Seminary* (Chem. 19); Theoretical Chemistry (Chem. 12).

Fourth Year

1. Physical Chemistry (Chem. 7); Metallurgy (Chem. 14); Metallurgical Chemistry (Chem. 15); Sanitary Analysis (Chem. 10); *Seminary* (Chem. 19); Special Analytic Chemistry (Chem. 18).

2. Physical Chemistry (Chem. 7); Metallurgical Chemistry (Chem. 15); Proximate Organic Analysis (Chem. 21); *Seminary* (Chem. 19); Special Courses (Chem. 18); *Thesis and Investigations* (Chem. 11).

3. Physical Chemistry (Chem. 7); Metallurgical Chemistry (Chem. 15); Proximate Organic Analysis (Chem. 21); *Seminary* (Chem. 19); Special Courses (Chem. 18); *Thesis and Investigations* (Chem. 11).

APPLIED CHEMISTRY AND ENGINEERING

To meet the needs of those who wish to fit themselves for such work as devolves upon the managers of establishments in which the operations depend upon chemical processes, a four years' course in chemistry with related engineering subjects has been arranged.

REQUIREMENTS FOR GRADUATION

The requirements for graduation are not varied from those already indicated on p. 81, except that the electives to be chosen from lists B and C must include certain engineering subjects, as follows: a minimum of three subjects shall be chosen from those listed under "Mathematics" in the General Description of Courses; a minimum of six subjects shall be taken from those listed under "Mechanical Engineering," and a minimum of two subjects from those listed under "Mechanics, Theoretical and Applied." A chemical thesis is required; and completion of the work leads to the degree of Bachelor of Science in Chemistry and Engineering.

COURSES OF INSTRUCTION BY YEARS AND TERMS

The prescribed and chemical electives, together with the engineering subjects necessary to meet the above conditions, are indicated below. Subjects must be taken in the term indicated, and those in *italics* must be taken in the year indicated.

First Year

1. *Advanced Algebra* (Math. 1, 2); Drawing, Gen'l Eng'g 1, 4; *General Chemistry* (Chem. 1); *German* 1, 5; Military 1, 2.

2. *Descriptive Inorganic Chemistry* (Chem. 2); *German* 1, 5; *Military* 1, 2; *Qualitative Analysis* (Chem. 3a); *Advanced Algebra and Trigonometry* (Math. 2 and 4).

3. Analytical Geometry (Math. 6); *Descriptive Inorganic Chemistry* (Chem. 2); Elements of *Organic Chemistry* (Chem. 4); *German* 1, 5; *Qualitative Analysis* (Chem. 3b); *Military* 2.

Second Year

1. Differential Calculus (Math. 7); *Military* 2; Physics 1, 3; *Quantitative Analysis* (Chem. 5a); *Rhetoric* 2; Shop Practice (Mech. Eng'g 1).

2. Advanced Analytical Geometry (Math. 8); *German* 6; *Military* 5; *Physics* 1, 3; *Quantitative Analysis* (Chem. 5b); *Rhetoric* 2; Shop Practice (Mech. Eng'g 1).

3. *German* 6; Integral Calculus (Math. 9); Iron and Steel Analysis (Chem. 8); *Military* 2; *Physics* 1, 3; *Rhetoric* 2; Shop Practice (Mech. Eng'g 1).

Third Year

1. Analytical Mechanics (Theo. and Appl'd Mech. 1 or 4); Metallurgy (Chem. 15); Metallurgical Analysis and Assaying (Chem. 14); Shop Practice (Mech. Eng'g 2); Special Analytical Chemistry (Chem. 18); *Seminary* (Chem. 19).

2. Chemical Technology (Chem. 6); Industrial Chemistry (Chem. 17); *Organic Chemistry* (Chem. 9); Resistance of Materials (Theo. and Appl'd Mech. 2 or 5); *Seminary* (Chem. 19); Steam Engines (Mech. Eng'g 16); Steam Boilers (Mech. Eng'g 17); Shop Practice (Mech. Eng'g 2).

3. Chemical Technology (Chem. 6); Electrical Engineering 1; Hydraulics (Theo. and Appl'd Mech. 3); Organic Chemistry (Chem. 9); Special Analytical Chemistry (Chem. 18); *Seminary* (Chem. 19); Shop Practice (Mech. Eng'g 2).

Fourth Year

1. Chemistry 14, 15, 18; Thermodynamics (Mech. Eng'g 7).

2. Chemistry 6, 12, 17, 18; Steam Engines (Mech. Eng'g 16); Steam Boilers (Mech. Eng'g 17); *Thesis and Investigation* (Chem. 11).

3. Chemistry 6, 12, 18; Civil Engineering 1; *Thesis and Investigation* (Chem. 11).

PHYSICAL COURSES

CLASSIFICATION OF SUBJECTS

Prescribed

Mathematics 2 (Advanced Algebra); $1\frac{1}{5}$ credits.
Mathematics 4 (Trigonometry); $\frac{4}{5}$ credit.
Mathematics 5 (Analytical Geometry); 1 credit.
Mathematics 7 (Differential Calculus); 1 credit.
Mathematics 8 (Advanced Analytical Geometry); 1 credit.
Mathematics 9 (Integral Calculus); 1 credit.
German 1, 2, 5, 6, or French 1, 2, 5; 5 or 6 credits.
Physics 1 and 3; 3 credits.
Chemistry 1, 2; 2 credits.
Rhetoric 2; 2 credits.
Military Science 1, 2; 2 credits.

Elective

List A (Physical)

Physics 5 and 6; 3 credits.
Physics 7; 3 credits.
Physics 8; $1\frac{4}{5}$ credits.
Mathematics 10 (Theory of Equations); 1 credit.
Mathematics 16 (Differential Equations); 1 credit.
Astronomy; 1 to 3 credits.

List B (Chemical-Physical)

Physics 5 and 6; 3 credits.
Physics 7; 3 credits.
Chemistry 3a; 1 credit.
Chemistry 4; 1 credit.
Chemistry 5a; 1 credit.
Chemistry 5b; 1 credit.
Chemistry 12; 1 credit.
Chemistry 7; 1 to 3 credits.

REQUIREMENTS FOR GRADUATION

The foregoing courses have been arranged for those wishing to prepare themselves for special work in physics and allied sciences. In addition to the subjects of the prescribed list, two general lines of work are offered under elective lists A and B, one of which must be taken with the list of prescribed subjects. The advanced theoretical work of the first of these lines is largely general mechanical physics; that of the second more especially chemical. The laboratory work follows the same lines. The additional studies necessary to complete the forty credits required for graduation may be elected from the various University courses, with the approval of the head of the department of physics.

COURSES OF INSTRUCTION BY YEARS AND TERMS

First Year

1. Advanced Algebra (Math. 2); German 1; Chemistry 1; Rhetoric 2; Military 1, 2.

2. Advanced Algebra and Trigonometry (Math. 2 and 4); German 1; Chemistry 2; Chemistry 3a or Rhetoric 2; Military 1, 2.

3. Analytical Geometry (Math. 6); German 5; Chemistry 2; Chemistry 4 or Rhetoric 2; Military 1, 2.

Second Year

1. Physics 1 and 3; Differential Calculus (Math. 7); Rhetoric 2; German 2 or Chemistry 5a; Military 1, 2.

2. Physics 1 and 3; Advanced Analytical Geometry (Math. 8); Rhetoric 2; German 6 or Chemistry 5b and 12; Military 1, 2.

3. Physics 1 and 3; Integral Calculus (Math. 9); Rhetoric 2; German 6 or Chemistry 12; Military 1, 2.

Third Year

Physics 5 and 6; Mathematics 10 and 16, and Astronomy, or Chemistry 7 and German 2 and 6; electives.

Fourth Year

Physics 7, or Physics 7 and 8; electives.

It will be generally necessary to follow the above, but other arrangements consistent with sequences of course may be made in special cases.

DESCRIPTION OF DEPARTMENTS

CHEMISTRY

The chemical offerings include courses of instruction in general elementary, inorganic, organic, physical and theoretical chemistry, and several lines of qualitative and quantitative analysis. [See under *Chemistry*, in DESCRIPTION OF COURSES.]

The first term is devoted to the consideration of the fundamental principles of chemistry, the purpose being to afford as thorough an introduction to chemical science as is practicable in the time allotted.

In succeeding courses the work becomes more special in character, but the required chemical subjects constitute a backbone of scientific preparation which provides opportunity for a thorough grounding in the principles and laws of chemistry; while, by proper selection from the numerous electives, one may specialize along any of the lines of analytical or applied chemistry, or pharmacy, or may further develop his knowledge of pure chemistry.

In order that an acquaintance with chemical literature may be had, and to keep pace with the advances in chemistry, students of the third and fourth years are required to take part in the chemical seminary in which the work con-

sists chiefly of reviews and discussions of assigned articles in current numbers of the various journals.

Two or three terms' work in the fourth year may be devoted to the investigation of some chemical problem. This practice both furnishes an opportunity to specialize along some chosen line and serves as an introduction to the methods of chemical research.

To students who are preparing themselves to become teachers of science, an opportunity is offered for the acquirement of some experience in supervising laboratory practice in Elementary Chemistry. The work will include criticism and discussion of methods and application of pedagogical principles and will be conducted with the coöperation of the department of pedagogy.

APPLIED CHEMISTRY

In this department there are offered ten separate courses in technological subjects. These require as preliminary work the seven general and analytical courses from 1 to 5b, inclusive. They may be further supplemented by special advanced work along some chosen line. For special description of courses, see under *Chemistry* in the DESCRIPTION OF COURSES. Frequent visits are made to metallurgical and other works employing chemical processes. Seminary work along general and technical lines is conducted for two years of the course. The purpose of the course is to offer the largest possible opportunity for equipment as technical and manufacturing chemists, superintendents, etc., or as chemical engineers in the work of supervising or planning the installation of metallurgical or other chemical plants.

PHYSICS

The department of physics offers a lecture course in general descriptive physics with class room experiments, extending through the year, and accompanied by an introductory laboratory course in physical measurements. This is followed by two courses, one experimental and the other theoretical. In the experimental course the student is practised in the most exact methods of making the fundamental physical measurements, and taught how to discuss his results. The theoretical course running parallel to this, discusses, with the aid of elementary calculus, the theory of some of the

main subjects of physics. In the senior year, the student is supposed to take up some special problem for investigation and to center his laboratory work about that. An advanced mathematical course is also offered for those wishing to follow the most advanced theories and results of the science.

THE MATHEMATICAL GROUP

AIMS

The mathematical group includes the entire offering of the University in pure mathematics, astronomy, and physics, and has for its purpose the laying of the mathematical foundation for special work in any one of these lines, as well as an opportunity for advanced work. It is hoped that the courses offered will meet the requirements of those who need mathematics as a tool as well as those who wish to make it a specialty.

Parallel to the pure mathematics two lines of associated work in applied mathematics are offered, namely: in physics and astronomy. Either of these may be taken by the student wishing to graduate from this group. The one leads through the physics of the sophomore year to the mathematical theory of electricity and magnetism, heat, light, and sound; the other through surveying to celestial mechanics, and the general and mathematical astronomy. In addition to these, a course in astronomy and physics is offered including the mathematics through the junior year, but leading to theoretical astronomy and advanced physics in the senior year.

CLASSIFICATION OF SUBJECTS

PRESCRIBED

General Engineering Drawing 1, 2, 4; 2 credits.
Mathematics 2, 4, 6, 7, 8, 9, 10, 11, 14, 16; $9\frac{2}{5}$ credits.
Rhetoric 2; 2 credits.
Military Science 1, 2; 2 credits.

ELECTIVE

List A (Mathematics and Astronomy)

Mathematics 17; 1 credit.
Mathematics 13, 23 or 12, 18, 24; $1\frac{4}{5}$ credits.
Mathematics 20, 21, 22 or Astronomy 7, 8, 9; $1\frac{4}{5}$ credits.

Mathematics 15 or Astronomy 10.
Astronomy 1, 2, 3, 4; 4 credits.
Physics 1, 3; 2 credits.
Civil Engineering 10; 1 credit.
*German 1, 2, 5, 6 or French 1, 2, 5; 5 or 6 credits.

List B (Mathematics and Physics)

Mathematics 13, 23 or Mathematics 12, 18, 24; $1\frac{4}{5}$ credits.
Mathematics 15, 17; $2\frac{1}{5}$ credits.
Physics 1, 3, 5, 6; 6 credits.
*German 1, 2, 5, 6 or French 1, 2, 5; 5 or 6 credits.

List C (Astronomy and Physics)

Astronomy 7, 8, 9 or Mathematics 20, 21, 22; $1\frac{4}{5}$ credits.
Astronomy 4a, 4b, 5, 6; 4 credits.
Astronomy 10; $1\frac{1}{5}$ credits.
Physics 1, 3, 5, 6; 5 credits.
Civil Engineering 10; 1 credit.
German 5, 6; 5 credits.

List D

Anthropology 1; 1 credit.
Botany 1 or 6; 1 or 3 credits.
Chemistry 1, 3a, 3b, or 4; 1 or 3 credits.
Economics 1 to 8; 2 to 6 credits
English 1, 2; 3 credits.
French 1, 5, 2 or German 1, 5, 2, 6; 6 credits.
Geology 1, 3, 4; 1, 2, or 3 credits.
History 1, 2; 1 or 3 credits.
Latin 1, 2, 3; 3 credits.
Meteorology 1; $\frac{2}{5}$ credit.
Mineralogy 1, 2; 1, 2, or 3 credits.
Pedagogy 1 to 7; 1 to 4 credits.
Philosophy 1 to 8; 1 to 4 credits.
Physiology 1 or 4; 1 or 3 credits.
Political Science 1 to 9; $\frac{2}{5}$ to $9\frac{2}{5}$ credits.
Psychology 1 to 8; 1 to 4 credits.
Theoretical and Applied Mechanics 1; 1 credit.
Zoölogy 1, 8, 10; 1, 2, or 3 credits.

*The requirement in German is satisfied by courses 5 and 6 or by 6 preceded by four terms of 1 and 2.

REQUIREMENTS FOR GRADUATION

To graduate as a Bachelor of Science in the mathematical group, it is necessary for the student to complete the list of prescribed subjects, together with those of any one of lists A, B, or C of electives, and to present an acceptable thesis. The necessary number of forty full term-credits for University studies may then be made up by election from lists A, B, C, and D.

COURSES OF INSTRUCTION BY YEARS AND TERMS

The studies of the mathematical group may best be taken according to the following outlines of courses in mathematics and physics, in mathematics and astronomy, and in astronomy and physics, respectively.

The electives provided for in the junior and senior years may be readily chosen by a reference to the preceding lists of electives and to the scheme or table of subjects by years and terms.

COURSE IN MATHEMATICS AND PHYSICS

First Year

1. Advanced Algebra (Math. 2); Engineering Drawing 1, 4; French 1, 5 or German 5; Military 1, 2; Rhetoric 2.

2. Trigonometry (Math. 4); Descriptive Geometry and Lettering (Drawing, Gen'l Eng'g 2); French 1, 5 or German 5; Military 1, 2; Rhetoric 2.

3. Analytical Geometry (Math. 6); French 1, 5 or German 5; Military 2; Rhetoric 2; Electives.

Second Year

1. Differential Calculus (Math. 7); Physics 1, 3; French 2 or German 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); French 2 or German 2, 6; Military 2; Physics 1, 3.

3. Integral Calculus (Math. 9); French 2 or German 2, 6; Military 2; Physics 1, 3.

Third Year

1. Theory of Equations (Math. 10); Least Squares (Math. 14); Physics 5; Electives.

2. Theory of Determinants (Math. 11); Differential Equations (Math. 16); Physics 5; Electives.

3. Geometry of Space (Math. 17); Differential Equations (Math. 16); Physics 5; Electives.

Fourth Year

1. Modern Geometry (Math. 23); Physics 6; Mathematical Seminary and Thesis (Math. 15); Electives.

2. Theory of Functions (Math. 13); Physics 6; Mathematical Seminary and Thesis (Math. 15); Electives.

3. Theory of Functions (Math. 13); Physics 6; Mathematical Seminary and Thesis (Math. 15); Electives.

COURSE IN MATHEMATICS AND ASTRONOMY

The freshman and sophomore years are the same as in the preceding course, except that Surveying (C. E. 10) is required in spring term of first year and that Astronomy 4a takes the place of Physics 1, 3, spring term second year.

Third Year

1. Theory of Equations (Math 10); Differential Equations (Math. 16); Astronomy 4b; Electives.

2. Theory of Determinants (Math. 11); Differential Equations (Math. 16); Astronomy 5; Electives.

3. Geometry of Space (Math. 17); Least Squares (Math. 14); Astronomy 6; Electives.

Fourth Year*

1. Modern Geometry (Math. 23); Astronomy 7: Mathematics 15 *or* Astronomy 10; Electives.

2. Theory of Functions (Math 13); Astronomy 8; Mathematics 15 *or* Astronomy 10; Electives.

3. Theory of Functions (Math. 13): Astronomy 8; Mathematics 15 or Astronomy 10; Electives.

ASTRONOMY AND PHYSICS

Freshman and sophomore years same as before excepting that Astronomy 4a is required in the spring term of the sophomore year.

Third Year

1. Theory of Equations (Math. 10); Desc. and Gen'l Astronomy (Astron. 4b); Least Squares (Math. 14).

2. Theory of Determinants (Math. 11); Cosmogony (Astron. 5); Differential Equations (Math. 16); Electives.

3. Practical Astronomy (Astron. 6); Differential Equations (Math. 16).

Fourth Year*

1. Theory of Orbits (Astron. 7); Physics 5 and 6; Electives.

2. Perturbations (Astron. 8); Physics 5 and 6; Electives.

3. Celestial Mechanics (Astron. 9); Physics 5 and 6; Electives.

*Mathematics 20, 21, and 22 will be given in 1897-8 in place of Astronomy 7, 8, and 9.

DESCRIPTION OF DEPARTMENTS

ASTRONOMY

The instruction given in astronomy is planned to meet the needs of four distinct classes of students, viz: (a) those who do not wish to take the time necessary to become thoroughly familiar with the facts, principles, and methods of the science, but who desire a general acquaintance with its present state and some idea of how this state has been reached. (b) Engineers whose work necessitates a practical knowledge of some parts of it. (c) Those students of the College of Science who wish to specialize in the geological and biological sciences, and who require a more intimate acquaintance with the science than can be got in one term's work. (d) Those students who wish to make astronomy their specialty.

Instruction is given by text-book, lectures, and laboratory work. In the first courses of instruction, the work of the laboratory is necessarily subordinated to that of the recitation room; but as soon as the general notions of the science become fixed in his mind, the student is required to take data and solve practical problems in the Observatory; the work being so graded as to make ever increasing draughts upon his fund of information and so varied as to acquaint him with the methods of work with instruments of the typical astronomical observatory. After the student has been given sufficient practice to enable him to comprehend and appreciate the more advanced subjects of theoretical astronomy, an opportunity is provided for him to familiarize himself with these subjects by the lectures and work of the senior year.

For students of class (a) course 4a, presupposing mathematics through trigonometry only, is offered; for the second, courses 4a, and 6, requiring the same preliminary mathematics and a term's experience in practical work with instruments, is given; for the third, courses 4a, 4b, 5, and 6, extending through four terms and requiring the same mathematical preparation as course 4a; and for the fourth class, all astronomical courses from 4a—10 inclusive, and also mathematics 20, 21, 22, are offered. Courses 7, 8 and 9 are to be given in alternate years with mathematics 20, 21, and 22. The courses in astronomy 7, 8, and 9, as also mathematics 20, 21, and 22, count either as post-graduate

or as undergraduate work, but neither can count for both. The subjects treated in the astronomical seminary will be related to those considered in courses astronomy 7, 8 and 9, and mathematics 20, 21, and 22 respectively.

EQUIPMENT

The equipment of the astronomical department consists of a students' astronomical observatory, containing the following instruments:

An equatorial telescope of 12 inches aperture, the optical parts of which are by Brashear. The instrument was built and mounted by Warner & Swasey. It is provided with graduated circles, driving clock, filar micrometer, a complete set of positive and negative eye-pieces, and a dial for setting in right ascension. The construction of the telescope is such that spectroscopic or photographic apparatus may be attached without further work on the mechanician's part; a new 4-inch equatorial by Soegmüller with graduated circles, driving clock, and eye-pieces, and an old 4-inch equatorial by Newton & Co., to be used in photometric eye estimates; a combined transit and zenith telescope by Warner & Swasey, with the usual micrometer and a number of smaller instruments, such as chronometers, a Riefler clock, an altazimuth, two chronographs, two sextants with mercurial horizons, two small astronomical transits, one of 21 inches by Soegmüller, and one of 24 inches by Newton & Co., a Green barometer and thermometers, and half a dozen masonry piers for portable instruments for the use of students in practical astronomy.

MATHEMATICS

The courses offered in pure mathematics are so arranged as to meet the needs (a) of those who desire such mathematical knowledge as is necessary to carry on investigation in some line of applied mathematics and (b) of those who wish to make mathematics a specialty. The instruction is given, for the most part, by the aid of a text-book, but several of the advanced courses are given by lectures with collateral reading. To cultivate a spirit of independent investigation, all senior and graduate students, making mathematics their major, are required to take in connection with their thesis a

year's work (two-fifths study) in the mathematical seminary, where the results of their investigation are presented and discussed. To the seniors and graduate students two lines of work in pure mathematics are offered, and each is given on alternate years. During 1897–8 will be given a course in modern geometry (Math. 23) and the theory of functions (Math. 13). In the following year will be given invariants (Math. 12), higher plane curves (Math. 18), and algebraic surfaces (Math. 24).

Courses 10 to 24 (excepting 19) count either as graduate or undergraduate work but in no case as both.

EQUIPMENT

The department is supplied with eighty-five of Brill's mathematical models. The collection includes an excellent set of plaster models illustrating the properties of surfaces of the second order, a set of string models for ruled surfaces, a set of paper models illustrating the real circular sections of certain conicoids, a complete set of Brill's models for the theory of functions, and a collection of surfaces of third order.

PHYSICS

For a general description of the work of the department and the physical equipment see pp. 73 and 75.

THE NATURAL SCIENCE GROUP

AIMS

The courses of the natural science group are especially intended:

1. To give a thorough liberal education with a basis in the objective sciences.

2. To prepare for the pursuit of specialties in zoölogy, entomology, physiology, botany or geology, as a scientific career.

3. To lay in biological work and study a liberal foundation for a course in medicine.

4. To prepare for the teaching of the natural or physical sciences in high schools and colleges.

Special advantages are offered to graduate students for whose work the museums, laboratories, and libraries, and the

field and experimental equipment of the University and of the associated State Laboratory of Natural History, furnish an extraordinarily full provision. The University Biological Station, at Havana, is regarded as one of the University laboratories, and work done there by students may receive credit like work in any of the other laboratories.

CLASSIFICATION OF SUBJECTS

PRESCRIBED

Art and Design 1, 2; 2 credits.
Chemistry 1, 3a, and 3b or 4; 3 credits.
German 1, 2, 5, 6; 5 or 6 credits.*
Mathematics 1 to 6; 2 credits.
Military Science 1, 2; 2 credits.
Rhetoric 2; 2 credits.

ELECTIVE.

List A† (Major Courses)

Astronomy 4 to 6; 1 to 4 credits.
Botany 1 to 5; 3 to 6, or 9 credits.
Chemistry 5, 7, 9, 12; 3 credits.
Geology 1, 2; 2 to 6 credits.
Mineralogy 1, 2; 1, 2, or 3 credits.
Paleontology 1; 2 credits.
Physics 1, 3; 3 credits.
Physiology 1, 2, 3, 5; 2 to 8 credits.
Zoölogy 1, 2, 3, 4 to 7, 9; 2 to 9 credits.

List B (Minor Courses)

Botany 6 or 1a and 1b; 1 or 2 credits.
Geology 4 or 1a and b or 1a and c; 1 or 2 credits.
Physics 2; 1 credit.
Physiology 4; 1 credit.
Zoölogy 10a or 2; 1 or 2 credits.

List C (Miscellaneous)

Anthropology 1; 1 credit.
Anthropometry 1; $\frac{1}{5}$ credit.

*This requirement may be satisfied by courses 5 and 6, or by course 6 preceded by four terms of 1 and 2.

†No number of credits in any subject will be accepted as major work other than the numbers specified against that subject in list A. Credit will not be given for both major and minor work in the same subject.

Art and Design 1; 1 credit.
Astronomy 4; 1 credit.
Economics 1 to 8; 2 to 8 credits.
English 1, 2, 5, 6; 3 or 6 credits.
French 1, 2, 5; 3 or 6 credits.
German 2, 3; 1 to 5 credits.
History 1 to 4, 7 to 12; 3 to 9 credits.
Mathematics 5 to 11; 1 to 4 credits.
Meteorology 1; $\frac{1}{2}$ credit.
Pedagogy 1 to 8; 2 to 10 credits.
Pharmacology 2 credits.
Philosophy 1 to 8; 1 to 7 credits.
Physics 5, 6; 1 to 3 credits.
Physiology 5; 1 credit.
Political Science 1 to 9; $\frac{2}{5}$ to $9\frac{2}{5}$ credits.
Psychology 1 to 8; 1 to 9 credits.
Rhetoric 3, 4; 4 credits.
Zoölogy 11; 1 credit.

The major and minor courses in Lists A and B in this group are respectively the maximum offerings and the minimum requirements in the various subjects of these lists.

REQUIREMENTS FOR GRADUATION

In the natural science group a student may graduate from either a specialized or a general course.

A specialized course is one containing at least two years of major work in a single subject preceding the senior year, followed by an additional year of major work in that subject, and the writing of an acceptable thesis. No student may be enrolled in a specialized course without the permission of the head of the department in which he wishes to do his principal work. Only those students who pursue a specialized course will, as a rule, be selected for fellowships, scholarships, and other similar University honors. A general course is one in which less than three years' work in any one line is required for graduation, and in which no thesis is required.

Students who specialize in geology or mineralogy may count all work done in these branches, and their credits in chemistry, in the list of credits required before the beginning of the senior year.

No student may graduate in natural science until he has completed all the required courses, has done at least nine terms' work on one major elective, or twelve terms' work on more than one such major (list A), and has taken at least minor courses in all the other electives in which such courses are offered (list B). The necessary number of forty full term-credits for University studies may be made up by additional elections from the three lists of electives.

A graduate from a four years' medical course at a school recognized by the University as of high rank may, if a matriculated student, receive for his professional medical studies credits in this group equal to one year's resident study at the University, being thus enabled to obtain his Bachelor's degree in science after a three years' University course.

COURSES OF INSTRUCTION BY YEARS AND TERMS

The following list of prescribed studies and major electives shows the terms in which the principal studies of the natural science group must be taken. The prescribed studies, which are in *italics*, must be taken also in the year indicated. Students intending to graduate from a specialized course should begin the study of their special subjects at the earliest time practicable.

FIRST YEAR

1. *Advanced Algebra* (Math. 1, 2); *Art and Design* 1; *Chemistry* 1; *Military* 1, 2; Zoölogy 10, 11.

2. *Chemistry* 3a; *Military* 1, 2; *Trigonometry* (Math. 3, 4); Zoölogy 1, 2, 3.

3. *Art and Design* 2; Botany 6; *Chemistry* 3b, 4; Entomology, Practical (Zoöl. 8); *Military* 2; Zoölogy 1, 2.

SECOND YEAR

1. Botany 1; *German* 5; *Military* 2; Mineralogy 1; Physics 1, 3; Zoölogy 1, 3, 5, 10, 11.

2. Botany 1; Embryology (Zoöl. 4); Entomology (Zoöl. 6); Geology 1; *German* 1, 5; *Military* 2; Physics 1, 3; Physiology 1.

3. Botany 1; Entomology (Zoöl. 6); Geology 1; *German* 5; *Military* 2; Physics 1, 3; Physiology 1.

THIRD YEAR

1. Bacteriology (Bot. 2); Botany 3; Entomology, Advanced (Zoöl. 7); Geology 1; *German* 2; Physiology 2; *Rhetoric* 2; Zoölogy 1, 10, 11.

2. Botany 3, *German* 6; Mineralogy 2; Paleontology 1; Physiology 2; *Rhetoric* 2; Zoölogy 4 (Embryology), 5, 6 (Entomology), 7.

3. Botany 4; *German* 6; Mineralogy 2; Paleontology 1; Physiology 2; *Rhetoric* 2; Zoölogy 5, 6 (Entomology), 7, 8.

FOURTH YEAR

1. Thesis (Bot. 5; Geol. 2; Zoöl. 9).

2. Thesis (Bot. 5; Geol. 2; Physiol. 3; Zoöl. 9).

3. Mineralogy 2; Paleontology 1; Thesis (Bot. 5; Geol. 2; Physiol. 3; Zoöl. 9).

SUGGESTIONS AS TO CHOICE OF COURSES

Students wishing to take major courses in several natural science subjects, with the intention of graduating in natural science without a thesis, should take the required subjects of the freshman year together with zoölogy 2; may follow this in the second year with botany 1, German, physics, and military, each throughout the year; may select for the junior year mineralogy 1, to be followed by geology 1, bacteriology or elementary entomology, embryology, general biology, German, minor physiology, and rhetoric 2, finishing geology 1 in the fall term of the senior year, and completing their course by selecting studies amounting to eight elective credits from the remaining subjects open to them. Numerous variations of this course may readily be arranged to the same general effect.

Those wishing to concentrate their major work in zoölogy only, should take courses 1, 4, and 5 in zoölogy, beginning with the second term of the freshman year; minor courses in physiology, physics, and botany, in the second year; mineralogy 1 and geology 4 in the third year; and anthropology 1, and thesis investigation during the senior year.

For a zoölogical course with principal reference to entomology, zoölogy 2 may be taken instead of 1, and followed by courses 6 and 7, with the omission of course 4 from the above list.

The student desiring to specialize in physiology should take zoölogy 3 and follow it with all the physiology offered, except course 4. His work may be otherwise like that suggested above for the zoölogical specialist.

A special course in botany may be made up on lines sim-

ilar to those of the special zoölogical course by taking, instead of major zoölogy, the botanical courses 1 to 4 in the second and third years, preferably preceded by zoölogy 6 in the freshman year, and followed by botany 5 (thesis work).

Students who desire to make the most of the offerings in geology are advised to take chemistry in the freshman year, begin their mineralogy in the fall term of the sophomore year, take geology in the winter and spring terms of that year and the fall term of the junior year, take mineralogy 2, or paleontology 1 during the winter and spring terms of the junior year, and the remaining subjects together with thesis investigation (geology 2) during the senior year.

SPECIAL COURSES PRELIMINARY TO MEDICINE

Students desiring a course of study leading to a degree in natural science as a liberal preparation for a course in medicine are advised to take the list of studies required for graduation (16 credits), together with zoölogy 3, embryology (zoölogy 5), physiology 1 (or 1 and 2); botany 6, bacteriology (botany 2), physics 1, 3, mineralogy 1, geology 4, pharmacology 1, psychology 3, and logic (philosophy 8).

This course may be conveniently arranged as follows:

MAJOR COURSE.

First Year

1. *Advanced Algebra* (Math. 1); *Art and Design* 1; *Chemistry* 1; *Military* 1, 2.
2. *Chemistry* 3a; *Military* 1, 2; *Trigonometry* (Math. 3); Zoölogy 3.
3. *Art and Design* 2; Botany 6; *Chemistry* 4; *Military* 2.

Second Year

1. *German* 5; *Military* 2; Physics 1, 3; Zoölogy 3.
2. *German* 5; *Military* 2; Physics 1, 3; Physiology 1.
3. *German* 5; *Military* 2; Physics 1, 3; Physiology 1.

Third Year

1. Bacteriology (Bot. 2); French 5 or Physiology 2; *German* 2; *Rhetoric* 2.
2. French 5 or Physiology 2; *Rhetoric* 2; Zoölogy 4.
3. Philosophy 3; French 5 or Physiology 2; *German* 6; *Rhetoric* 2.

Fourth Year

1. Materia Medica 1; Psychology 2.
2. Geology 4; Materia Medica 1; Botany 3.
3. Chemistry 20; Materia Medica 1; Philosophy 8.

For the benefit of those who are preparing for medicine but who cannot take more than a two years' course at the University, the following scheme of study is suggested:

MINOR COURSE

First Year

1. Advanced Algebra (Math. 1); Art and Design 1; Chemistry 1; Military 1, 2.
2. Chemistry 3b; Military 1, 2; Trigonometry (Math. 2); Zoölogy 3.
3. Astronomy 4; Botany 6; Chemistry 4; Military 2.

Second Year

1. Bacteriology (Bot. 2); Military 2; Physics 1, 3; Zoölogy 3.
2. Embryology (Zoöl. 4); Military 2; Physics 1, 3; Physiology 1.
3. Chemistry 20; Military 2; Physics 1, 3; Physiology 1.

DESCRIPTIONS OF DEPARTMENTS

BOTANY

Seven courses of instruction are offered in this subject—five primarily intended to meet the wants of students making botanical work more or less a specialty, and the sixth occupying a single term, complete in itself, for students whose chief attention is given to other branches. Three to nine terms' work constitutes a major course; that of the single term, course 6, a minor course. To a very large extent natural objects are studied rather than books, but constant endeavor is made to introduce students to pertinent existing literature. In the laboratory much use is made of the compound microscope, and special attention is given to its manipulation for best results, and to the preparation of objects. The seventh course is pharmaceutical botany.

EQUIPMENT

The botanical laboratories are: One of large size with full equipment of microscopes, microtomes, aquaria, models, charts, etc., for general work; one specially arranged and fitted up for bacteriological instruction and investigation, supplied with sterilizers, thermostats, microscopes, a full

line of glassware, metal vessels, and chemicals; one adjoining the latter and used in connection with it for vegetable physiology, and having attached a glazed structure, two stories in height, well adapted to facilitate experiments upon living plants and for the growth of specimens required in the laboratories. There are also provisions for private laboratory work by instructors. The department is furnished with a lecture room; a room for the herbarium and facilities for work in connection therewith; work rooms for the preparation of specimens and material; storage rooms for apparatus, utensils, reagents and materials; dark room for photography; rooms for offices—all in convenient association and provided with the necessary materials and apparatus for ordinary class work and for advanced research.

Special attention has been given to parasitic fungi; and the collections of specimens and of the literature upon the subject are ample for various lines of original investigation.

GEOLOGY AND MINERALOGY

In this department four courses are offered in geology, two in mineralogy, and one in paleontology.

For students who wish more than a general acquaintance with these subjects, a course covering thirty-six weeks of class room and laboratory instruction has been arranged in geology, a like course in mineralogy, and one of twenty-two weeks in paleontology. A supplementary course of twenty-two to thirty-six weeks is offered those who select a geological subject for a thesis.

Engineers who wish an acquaintance with those portions only of geology which bear most directly on their future work are offered a course of eleven weeks.

To those who desire merely an outline of the most prominent facts and theories of geology, with some idea of the methods by which the geologist arrives at his conclusions, a course of eleven weeks is offered. All these courses are fully described under "Description of Courses."

EQUIPMENT

Apparatus.—The mineralogical laboratory contains individual desks for twenty-four students, each of which is furnished with reagent bottles, Bunsen burners, and all the other apparatus now considered necessary to a complete outfit for

blowpipe work in a first-class laboratory. It is also provided with a spectroscope; a specific gravity balance; an analytical balance; a trip scale; mortars (diamond, agate, wedgwood, and iron); a chemical hood equipped with sink and a complete set of reagents and apparatus for qualitative analysis; a blast lamp and blower, and a muffle furnace.

The advanced laboratory is equipped with individual desks for sixteen students, each supplied with apparatus as above; four contact goniometers, and two Fuess reflecting goniometers; one Bausch & Lomb lithological microscope, and three Fuess lithological microscopes; crystal models (550); thin sections of minerals and rocks (570); an apparatus for cutting and grinding thin sections of rocks, with a Jenney motor; apparatus for micro-chemical analysis; a self-registering barometer; an aneroid barometer and a telescopic hand level for topographic work.

For the recitation room there is a set of Kiepert's physical maps; Ramsay's orographic map of the British Isles; Haart's Alps; Chauvanne's Asia; geological and soil maps of Illinois; a series of geological maps of the United States, representing land development during the successive periods; a set of charts illustrating orography, erosion, deposition of metals, etc.; a series of relief maps; a complete lantern outfit, with microscope and solar attachment; four hundred lantern slides; an equipment for photography and the manufacture of lantern slides.

Materials.—The collection of fossils comes principally from the paleozoic, but includes a representative series from the higher groups. It contains 43,400 specimens. Six hundred and fifty of the types described in the reports of the Illinois geological survey are included, and also 200 thin sections of corals and bryozoa.

The collection of minerals contains 7,109 specimens, and that of rocks 2,912 specimens, among which is a large number of polished granites, marbles, and other ornamental building stones.

There is also a collection of Illinois soils containing 76 specimens; and a large collection of Illinois clays with their manufactured products.

PHYSIOLOGY

The special objects of the courses in human physiology are as follows: (1) to give to prospective students of medicine a detailed practical knowledge of the normal histological structure and vital processes of the body, and a working familiarity with the instruments of precision used in the investigation of disease. (2) To give to students of all branches of biology a training in deducing logically necessary conclusions from data obtained by their own observations. (3) To furnish such a knowledge of physiology as will serve as a basis for future studies in hygiene.

The laboratory method of instruction is chiefly followed, supplemented, when desirable, by lectures, demonstrations, references to standard literature, and recitations. The laboratory work predominates in the major and advanced courses; the lectures, demonstrations, and recitations in the minor course. In the more advanced courses each subject is treated, so far as time will permit, as if it were an original investigation. The student is guided to the best methods to be pursued, but the results are left for him to discover. At frequent intervals the results obtained are reviewed by the instructor, and, when necessary, completed, unified, and correlated with the facts learned from previous investigation, care being taken to show the student wherein he failed to obtain a full knowledge of the subject.

EQUIPMENT

The department of physiology occupies four rooms in Natural History Hall; a general laboratory, a lecture room, and a private laboratory on the top floor, and an animal room in the basement. The general laboratory, thirty-five by fifty-six feet, is fitted at one end with desks of the most approved pattern for chemical and similar work, and at the other end with heavy tables, especially designed for use with the microscope and other apparatus requiring a stable support. The private laboratory and preparation room of the instructor is furnished with cupboards for apparatus and reagents.

The apparatus of the department may be roughly divided into three classes: That for physico-physiological work, that for chemico-physiological work, and that for the mammalian anatomy and histology necessarily taught in connection with

the physiology proper. In the first class may be mentioned a Ludwig kymograph (Zimmermann's latest model) with automatic movement of the cylinder in the line of its axis, and an arrangement for varying the period of rotation from one revolution in two seconds to one per hour. Using the kymograph in conjunction with other apparatus, tracings are obtained showing the form and time elements of the different movements of the body (cardiac, respiratory, muscular, etc.), and measurements are made of the rate of transmission of pulse waves, nerve currents, etc. With the assistance of a tuning fork, kept in vibration electrically, and a Deprez signal (made by Verdin), these measurements are accurate to within one-two-thousandth of a second. A moist chamber, (made by the Cambridge Scientific Instrument Co.), with platinum and non-polarizable electrodes, is used in the study of the properties of muscles. Other instruments are a Fleischl spectropolarimeter, a Gower's hæmacytometer, a Gower's hæmaglobinometer, a spectroscope, and a Lautenschlager oven, with automatic temperature regulator.

The apparatus for the chemical side of the subject, although in the aggregate important and costly, is composed largely of small pieces, too numerous for individual mention. Among them may, however, be named a set of Hempel's apparatus for gas analysis, and a Knop azotometer, the last used mostly in urinary analysis.

For the measurements of mass, volume, temperature, barometric pressure, specific gravity, etc., so constantly necessary in both the physical and chemical work, the laboratory is well supplied with apparatus of the best construction, including a Sartorius balance, flasks and pipettes, thermometers, hydrometers, picnometers, etc.

For illustrative purposes in anatomy and histology the department has an Auzoux manikin, a human skeleton, a series of charts, mostly histological, about a hundred and fifty histological slides, and a number of wet preparations of lower animals. Compound and simple microscopes, microtomes, and the usual accessories for histological work are also available.

ZOÖLOGY

Zoölogy is taught in eleven courses: Three terms of major work, variously combined to form three courses, primarily

for students in the school of natural science; a term of embryology for those who have taken one of the preceding courses; five courses in entomology; one to three terms' work in comparative anatomy, zoölogical œcology, or advanced zoölogy for students specializing in that subject, and a year's work in independent investigation (senior) for those who select a zoölogical subject for the graduating thesis. Only the first term's work is necessarily common to all students in the college who desire to make zoölogical study a prominent feature of their course. At the end of this term three divergent lines are open, one leading mainly towards entomology, a second towards physiology and medical study, and a third towards zoölogical specialties and pedagogical zoölogy.

EQUIPMENT

The equipment of the zoölogical department is contained in four students' laboratories, an instructor's laboratory, a lecture room, a private office, a store room, and a dark room for photography. It includes twenty aquaria, forty-eight compound microscopes of the best makes (Zeiss, Reicherts, Leitz, and Bausch & Lomb), Zeiss dissecting microscopes, Abbé camera-lucidas, microtomes of five patterns (Zimmerman's Minot, Cambridge, Beck-Schanze, Bausch & Lomb, and Ryder), and the usual equipment of incubators, paraffine baths, etc. A set of Blaschka glass models of invertebrates, a set of Ziegler's wax models of embryology, two hundred and fifty wall charts, and some hundreds of permanent preparations in alcohol, are examples of the equipment for the illustration of lectures. Advanced and graduate students have the privilege of the free use of the library and equipment of the State Laboratory of Natural History, which occupies rooms in Natural History Hall. They are also admitted to the privileges of the University Biological Station at Havana, Illinois, and will be given credit for regular work done there. They are thus afforded ample opportunity for prolonged original work in several departments of zoölogical science, especially in those relating to the zoölogy of Illinois. The Bulletin of the State Laboratory is open to graduates for the publication of their papers.

Entomological students have similar access to the collections and resources of the State Entomologist's office, in-

cluding a well equipped insectary for experimental investigation.

THE PHILOSOPHICAL GROUP

AIMS

The philosophical group includes those sciences which deal both with man as an individual, in the mental and moral spheres, especially as these are connected with his physical being, and also with man in society. The branches of knowledge included in the group occupy a place among the divisions of biological science, and it is intended to carry the spirit of biology, in the commonly accepted sense, into the investigation of these subjects. The general aim and scope of the group is the study of the character and development of the individual and of society, of the relations of man to external nature, of the influence of natural selection on social development, and, finally, of the possible effect of artificial selection on that development, through both subjective and objective influences. In the treatment of the subjects an effort is made to arouse the scientific spirit, and to keep in close touch with the other work in the College.

Under this caption the subjects of psychology, pedagogy, economics, public law and administration, and philosophy are offered in the College of Science as electives to all chemical and natural science students, and to all students who desire to specialize in the philosophical subjects, with studies in the physical and natural sciences as a preparation for them. All the studies of this group are junior and senior subjects, open, as a rule, to those students only who have done two years of University work.

CLASSIFICATION OF SUBJECTS

PRESCRIBED

The same as in either the natural science or chemical group, pp. 80 and 95.

ELECTIVE

List A (Major Courses)

Economics 1 to 8; 2 to 11 credits.

Pedagogy 1 to 7; $\frac{2}{5}$ to $9\frac{4}{5}$ credits.

Philosophy 1 to 7; 1 to 6 credits.

Public Law and Administration 1 to 9; $\frac{2}{5}$ to $9\frac{2}{5}$ credits.

Psychology 1 to 9; 1 to 9 credits.

List B (Minor Courses)

Economics 1; 2 credits.
Philosophy 1; 1 credit.
Public Law and Administration 1; $1\frac{1}{5}$ credits.
Pyschology 1; 1 credit.

List C

As in the natural science group, except the philosophical subjects, p. 95.

REQUIREMENTS FOR GRADUATION

In this group, as in the natural science group, a student may pursue either a specialized or a general course.*

To graduate from the College of Science in the studies of this group, in a general course, the student must either complete the subjects of the prescribed list in the chemical group,† or must carry those of the corresponding list in the natural science group‡ and earn six full credits additional for major natural science studies, three of which must be biological. He must further do twelve terms' major work, or their equivalent, on subjects in the philosophical group; must take minor courses in all the philosophical subjects (except pedagogy) in which he has not completed a major course.

To graduate from this group in a specialized course the student must meet the general requirements for specialized courses, relating to thesis and amount of work required in the major subject.

Those who specialize in psychology may count all credits gained in that department, and any three earned previous to the senior year in botany 1 b, c; physiology 1, 2; philosophy 1, 8; zoölogy 3.

DESCRIPTION OF DEPARTMENTS

ECONOMICS

The instruction in this subject is based on the work of the first two years in science. The relation of the study to the biological sciences, commonly so called, is emphasized and kept steadily in view. In the courses in sociology the aim is to trace the evolution of society from primitive forms to its present complex structure, to examine the nature of its environment and its adaptation thereto, its present normal

*See page 96. †See page 80. ‡See page 95.

character and operations, and the forces, subjective and objective, which are at work tending to change its structure.

PEDAGOGY

See same, in the College of Literature and Arts, p. 53.

PHILOSOPHY

The work in this department includes history of philosophy, metaphysics, ethics, and logic. The object of their courses is primarily threefold.

1. To meet the wants of those students who desire to specialize in this department.

2. To give those who desire a more general knowledge of these subjects, some familiarity with the sphere of philosophical speculation and with the philosophical method as applied to the principles and presuppositions of the various sciences.

3. To show the relation of philosophy to practical life and the value of these studies as means of general culture.

PUBLIC LAW AND ADMINISTRATION

See same, in the College of Literature and Arts, p. 54.

PSYCHOLOGY

The aim of the work in this department is to furnish the student, largely by means of inductive study and laboratory methods, a knowledge of the laws according to which mind develops, and the influence of environment upon this development. Throughout the courses an effort is made to put psychology upon an exact basis as a natural science.

The elementary forces of mentality as exhibited in infant life are carefully studied with a view to determine some of the components of the adult mind. A comparative study of the mental life of animals is undertaken with a view to throw some light upon the morphology of mind. The mental life of defectives and pathological states of mind are discussed in their relations to the normal type. The advanced laboratory work is of a nature to develop a spirit of independent research on the part of the student. The relation of psychology to the physical biological sciences is kept in view, so that the student may be assisted in his endeavor to bring the manifestations of mind and matter into a related whole.

COLLEGE OF AGRICULTURE

FACULTY

ANDREW S. DRAPER, LL.D., PRESIDENT.
EUGENE DAVENPORT, M.AGR., DEAN, Animal Husbandry.
THOMAS J. BURRILL, PH.D., Botany and Horticulture.
STEPHEN A. FORBES, PH.D. Zoölogy.
CHARLES W. ROLFE, M.S., Geology.
DONALD McINTOSH, V.S., Veterinary Science.
ARTHUR W. PALMER, SC.D., Chemistry.
FRANK F. FREDERICK, Art and Design.
SAMUEL W. PARR, M.S., Applied Chemistry.
DAVID KINLEY, PH.D., Economics.
DANIEL H. BRUSH, Captain 17th Infantry, U. S. A., Military Science.
ALBERT P. CARMAN, SC.D., Physics.
HENRY E. SUMMERS, B.S., Physiology.
EDGAR J TOWNSEND, PH.M., Mathematics.
EVARTS B. GREENE, PH.D., History.
KATHARINE MERRILL, A.B., English.
WILLIAM O. KROHN, PH.D., Psychology.
WILLIAM H. VANDERVOORT, M.E., Mechanical Engineering.
HARRY S. GRINDLEY, SC.D., SECRETARY, Chemistry.
T. ARKLE CLARK, B.L., Rhetoric.
HERMAN S PIATT, A.M., French. [On leave.]
ARTHUR HILL DANIELS, PH.D., Philosophy.
CHARLES W. TOOKE, A.M., Political Science.
GEORGE D. HAMMOND, A.B., History. [On leave.]
FRANK SMITH, A.M., Zoölogy.
PERRY G. HOLDEN, M.S., Agricultural Physics.
RALPH P. SMITH, PH.B., German.

HELEN E. BUTTERFIELD, M.L., Rhetoric.
OSCAR QUICK, A.M., Physics.
EDWARD J. LAKE, B.S., Art and Design.
WILBER J. FRASER, B.S., Dairying.
JOSEPH C. BLAIR, Horticulture.
CHARLES F. HOTTES, M.S., Botany.
ALBERT R. CURTISS, Wood Working.
HENRY JONES, Blacksmith.

AIMS AND SCOPE

The College of Agriculture offers a course especially strong in chemistry, botany, zoölogy, physiology, and bacteriology, in which both agriculture and horticulture are taught from a scientific basis, always with regard to successful practice. The aim is to discuss and to teach the principles that underlie these two great arts.

Besides affording special preparation for a technical pursuit, it is hoped that this course will commend itself to all lovers of rural life and its affairs in offering them the means of keeping pace with the increasing desire for higher learning.

To give scope for individual preferences one full study is made elective after the freshman year. This affords the opportunity to elect by courses, if desired, and insures the uninterrupted pursuit of elective work.

METHODS OF INSTRUCTION

Instruction is by laboratory work, supplemented by lectures, text-books, and reference readings. Laboratory methods are regarded as peculiarly suited to the subjects of the course and to the needs of those who pursue them. The effort throughout is to teach technical principles and practices in the light of the most profound truths known to science. The College takes a high position in regard to the standing of the subject and the needs of the students.

Reference readings are almost constantly prescribed in standard volumes and periodicals with which the library is liberally supplied.

For purposes of illustration liberal use is made of experimental fields, live stock, buildings, and apparatus, as well as of the University grounds and cabinet collections.

The teaching force for technical work in agriculture and horticulture has been greatly increased during the year that has passed. In other lines the student in agriculture and horticulture receives instruction in the same classes with other students of the University, and thus enjoys all the advantages of the excellent laboratories and apparatus of the science departments.

EQUIPMENT

The equipment of the agricultural department has been materially increased by recent purchases of some excellent specimens of both cattle and sheep from some of the best breeders of the United States.

A small building has been fitted to accommodate a limited number of students in certain lines of dairy instruction, notably in pasteurizing, testing, separating, creaming, churning, etc.

The Agricultural Experiment Station, with a farm of 170 acres and suitable buildings, exhibits field experiments in testing the different varieties and modes of culture of field crops, and in the comparison and treatment of soils. It carries on experiments in agriculture, horticulture, dairying, and in feeding various kinds of food to animals of different ages and development. In common with similar departments in the several agricultural colleges of the country, it attempts to make positive additions to knowledge, and to further the development of agricultural science.

The extensive fruit- and forest-tree plantations give abundant opportunity for studies and illustrations in many horticultural lines, and add greatly to the effectiveness of class-room work.

The ornamental grounds which surround the University buildings contain about twenty acres, and are kept neat and attractive. These, with their trees and flowering shrubs, lawns, beds of flowers and foliage plants, walks and drives of different construction and styles, furnish illustrations for the classes in landscape gardening. A greenhouse contains a collection of plants of great value to the classes in floriculture and landscape gardening, besides furnishing students with practice in greeenhouse management.

The cabinets contain a series of colored casts of fruits, enlarged models of fruits and flowers; collections of seeds

of native and exotic plants, of specimens of native and foreign woods, of beneficial and injurious insects, and of specimens showing their work; numerous dry and alcoholic specimens and preparations; maps, charts, diagrams, drawings, etc.

The College has a supply of compound microscopes and other apparatus, and students have opportunity to learn their use and to make practical investigations with them. The herbarium is rich in specimens of useful and noxious plants, including many of the fungus parasites which cause disease to cultivated crops.

CLASSIFICATION OF SUBJECTS

PRESCRIBED

Agriculture 1a, 1b, 2a, 2b, † 3, 4, † 5, 6, 9; 8 credits.
Art and Design 1 and 2; 2 credits.
Botany 1, 2, 8; 5 credits.
Chemistry 1, 3a, 4; 3 credits.
English 1; $1\frac{1}{5}$ credits.
Horticulture 1a, 1b, 1c, *4, *5, *6, *7, *8, *10; $6\frac{2}{5}$ credits.
Military 1, 2; 2 credits.
Physiology † 1; 2 credits.
Rhetoric 2; 2 credits.
Thesis; 2 credits.
Veterinary Science † 2; 1 credit.
Zoölogy 3, 8; 3 credits.

*, † Subjects marked with a dagger may be taken instead of those marked with a star, and *vice versa*.

ELECTIVE

Agriculture 7, 8, 11; 3 credits.
Anthropology 1; 1 credit.
Architecture 1; 3 credits.
Astronomy 4; 1 credit.
Biology, General; 1 credit.
Botany 3, 4, 5; 6 credits.
Chemistry 5b, 5c, 13; 5 credits.
Economics 1 to 5, 9; $\frac{2}{5}$ to $5\frac{4}{5}$ credits.
English 1, 2; 3 credits.
French 5; 3 credits.
Geology 4, 1; 1 or 2 credits.
German 1 or 5; 2, 6; 3 to 6 credits.
History 1, 2, 3, 4, 7, 10 to 12; $1\frac{1}{5}$ to 9 credits.
Horticulture 2, 3, 9; 3 credits.

Mathematics 1, 3; 2 credits.
Mechanical Engineering 2; 1 credit.
Meteorology 1; $\frac{2}{5}$ credit.
Mineralogy 1; 1 credit.
Paleontology 1; 2 credits.
Philosophy 1, 5; 2 credits.
Physiology 2, 3; 5 credits.
Public Law and Administration 1, 2, 4 to 8; $\frac{1}{5}$ to $7\frac{2}{5}$ credits.
Psychology 1, 3, 6; 2 credits.
Veterinary Science 1, 2, 3; 6 credits.
Zoölogy 4, 5; 4 credits.

REQUIREMENTS FOR GRADUATION

The degree of Bachelor of Science is conferred upon the presentation of an acceptable thesis after the completion of the prescribed subjects and nine elective full term-studies.

The following scheme affords an outline of the possible courses and exhibits the years and terms in which the prescribed subjects may be most conveniently taken.

COURSES OF INSTRUCTION BY YEARS AND TERMS

First Year

1. Agriculture 2a; Horticulture 1a; Art and Design 1; Chemistry 1; Military 1, 2.

2. Agriculture 9; Horticulture 1b; Art and Design 2; Chemistry 3a; Military 1.

3. Agriculture 2b; Agriculture 1a; Horticulture 1c; Chemistry 4; Military 2.

Second Year

1. Agriculture 1b; Botany 1; Military 2; Rhetoric 2; Horticulture 2, 9, or Elective.

2. Zoölogy 3; Botany 1; Military 2; Rhetoric 2; Horticulture 3, 9, or Elective.

3. Agriculture 4; Botany 1; Military 2; Rhetoric 2; Horticulture 2, 9, or Elective.

Third Year

1. Agriculture 6; Zoölogy 3, or Horticulture 4, 5; English 1; Elective.

2. Botany 8; Physiology 1 or Horticulture 6; English 1; Elective.

3. Zoölogy 8; Physiology 1 or Horticulture 7; English 1; Elective.

Fourth Year

1. Agriculture 3 or Horticulture 8, 10; Botany 2; Elective.
2. Veterinary Science 2 or Horticulture 8, 10; Thesis; Elective.
3. Agriculture 5 or Horticulture 8, 10; Thesis; Elective.

WINTER SCHOOL IN AGRICULTURE

For the winter term students are admitted without entrance examination to a special short course in which are daily lectures and class exercises on some of the most important practical branches of agriculture, horticulture and veterinary science. This course is designed for young men already engaged in agricultural pursuits who cannot spend a long time in college, and yet are anxious to make the most of themselves and of their vocation. Such students have access to the library and museum collections of the University, and have admission to the courses of general lectures.

The details of this course vary from year to year. A special circular giving full information concerning it is issued each year several weeks before the opening of the winter term.

THE SCHOOL OF PHARMACY

The Chicago College of Pharmacy, which was formally united with the University May 1, 1896, is conducted as the technical *School of Pharmacy* of the University of Illinois.

Organized in 1859 as the Chicago College of Pharmacy, this was the first institution for pharmaceutical education established west of the Alleghanies, and the third in the United States. The war caused for a time the discontinuance of instruction, and shortly after the resumption of its activities the great fire swept it out of existence, so that the present establishment dates from 1872.

Noted European savants, moved with sympathy for the sufferers by the great conflagration, and actuated by interest in the cause of pharmaceutical education, presented the trustees of the institution a valuable outfit of apparatus, specimens and library, and it is from this nucleus that the school equipment has grown to its present excellent proportions.

In the diploma awarded to this school by the World's Fair Commissioners, July 14, 1893, the Library is referred to as "a collection of rare and very valuable books, printed in the 16th, 17th, and 18th centuries, including the works of Galen, published in Venice in 1556, and the entire volumes of the Edinburgh Dispensatory."

The School is situated near the business center of Chicago, at numbers 465 and 467 State Street, and occupies a building which was erected especially for its use. The lecture amphitheater, *Attfield Hall*, has seats for six hundred; the chemical and pharmaceutical laboratories, as also the microscopical laboratory and the dispensing laboratory, are commodious and well appointed.

The *Courses of Instruction*, covering two terms of twenty-five weeks each, extending from October 2d to April 23d, afford opportunities for a thorough technical training, such as is

necessary for the successful practice of pharmacy. The subjects taught are pharmacy, chemistry, botany, materia medica, pharmacognosy, physics.

The instruction is by lectures, illustrated by experiments, specimens, charts, etc., oral quizzes and recitations, written examinations, and laboratory practice.

ADMISSION

Any person at least 16 years of age who presents satisfactory evidence of such preliminary education as can be gained in the public grammar school, may be admitted.

GRADUATION

The degree of Graduate in Pharmacy will be conferred upon such persons as are 21 years of age, have satisfactorily completed the work of two full terms and have had four years practical experience in pharmacy, including the period of attendance at the Pharmacy School.

Advanced Courses in pharmacy and chemistry and the involved and allied sciences are provided at the University in Urbana, and lead to graduation with the degree of Bachelor of Science in Pharmacy and Chemistry.

The requirements for admission to these advanced courses are the same as for other University courses.

Persons competent to fulfill the general requirements for admission to the University may be granted credit upon the University courses for equivalent work satisfactorily completed at the School of Pharmacy.

Further information is given in the THIRTY-EIGHTH ANNOUNCEMENT.

GRADUATE SCHOOL

AIMS

It is the purpose of the graduate school to encourage advanced study and research at the University, and to promote high scholarship on the part of those who have completed an undergraduate course of instruction.

ORGANIZATION

The Graduate School is in charge of the Council of Administration of the University. The Council fixes the conditions of admission, approves the courses of instruction, prescribes the character of examinations, establishes requirements for degrees, and exercises general supervision over all the affairs of the school. The Dean of the General Faculty is the executive officer of the school, and he should be consulted on all matters pertaining thereto.

ADMISSION AND REGISTRATION

Graduates of the University, and of other colleges and universities of approved standing, may be admitted to membership in the Graduate School upon presentation of their credentials. Other persons suitably qualified may gain admission by special vote of the Council of Administration upon such conditions as may be imposed in each case. Candidates for admission register with the Dean of the General Faculty at the beginning of each academic year, during the registration period preceding the commencement of instruction for the year in the University.

Non-residents may register by securing blanks, which are sent on application, and returning them properly filled out not later than the time specified. Correspondence in this case should be commenced early that no delay in registration may occur.

Registration may be accepted at other times, but the time-limit required for degrees counts from the date of registration. In all cases one registration covers an academic year or such fractional part thereof as then remains. A graduate student who desires to be absent from the University during any part of the year for which he is registered, must obtain from the Dean of the General Faculty a certificate of permission covering the period of absence.

Admission to the Graduate School is indicated by a certificate issued to each successful candidate by the dean; this certificate must be presented to the Business Manager for his signature, and, if the holder is not already matriculated in the University, must be accompanied by the required fee. The certificate, properly signed, is to be shown to the head of each department in which instruction is sought.

With the exceptions named below, all members of the Graduate School are required to be in regular attendance at the University, and to do all the work for which they are registered in the departments to which such work belongs. In case of absence on leave, or when absence is necessary to carry on investigations included in approved courses of study, the requirement of continuous residence may be modified by the Council of Administration. Graduates from baccalaureate courses of this University may register as non-resident members of the Graduate School; and all members of the school who have completed the residence period required for advanced degrees may register as non-residents while completing the work required for such degrees.

STUDIES AND EXAMINATIONS

As far as can be indicated by a statement of time, full work for a graduate student consists in the use of forty-five hours a week in the lecture rooms, laboratories, etc., and in private study. Assignments of work are made upon this basis; but great variations naturally result from the subject-matter in hand, and from the abilities of individuals. Each student must select one principal line of study, called his major subject, and upon this major subject at least one-half of his work must be done; and any greater proportion of his time, up to the whole of it, may be thus devoted if proper approval is had. When work upon the selected major subject

is not arranged to require all of the student's attention, he must choose one or two minor subjects, as may be necessary to complete a full course of study. Usually, at least one minor subject should be taken. Not more than two may be taken at any one time.

The major study must be approved as graduate work for this University. The minor subjects may, under approval, be chosen from the offerings to graduates, or, except in the College of Engineering, from undergraduate courses exclusive of those usually open to freshmen. But all candidates for advanced degrees must direct their selection towards some well-defined end, determined for the most part by the character and purpose of the major study.

In architectural and engineering subjects, at least the major line of study and not less than two-thirds of the entire work, must be taken from lists marked "primary,"* and any remaining amount to complete a full course may be taken from those designated "secondary," under the same head with the primary list.

All courses of study leading to degrees in the Graduate School are subject to approval: first, by the head of the department of the University in which the major subject for each student belongs; second, by the dean of the College including such department; and third, by the Dean of the General Faculty. The latter officer reports to the Council of Administration for final action. The signatures of the heads of departments in which chosen minor subjects belong must also be obtained before the list reaches the Dean of the General Faculty. The lists of studies, as finally approved, are deposited with the registrar of the University. No changes may subsequently be made except under the same line of approvals, but extension of time may be arranged with the professors concerned and with the Dean of the General Faculty.

Examinations are required in all subjects, and reports upon these are made to the Registrar of the University. Graduate students in undergraduate classes are examined with these classes.

The head of each department in which the student does

*See the courses for graduates in architecture and engineering, in the General Description of Courses.

his major work is charged with the direction and supervision of such major work, and, in a general way, with the supervision of the student's entire course of study. He fixes the time and method of all examinations not otherwise provided for, sees that they are properly conducted, and reports results to the Registrar. It is his duty also to keep the Dean of the General Faculty informed concerning all matters affecting the interests of the student, and of the School in connection therewith.

DEGREES AND FELLOWSHIPS

(Consult the INDEX.)

THE LAW SCHOOL

The Law School will be opened at the beginning of the University year 1897-98. A circular, setting forth the courses of study and the conditions of admission and graduation, will be issued in June.

GENERAL DESCRIPTION OF COURSES

Following the description of each course of instruction will be found the necessary requirements, if any, for admission to that particular course. Careful attention must be given to these requirements and to the sequence of studies thus indicated. For instance, under Architecture 4, for students of the College of Engineering, page 126, there are required "Mathematics 4;" "Physics 1 and 3," and "Architecture 2 and 3." Turning now to these subjects, it is found that Mathematics 4 is Trigonometry, Physics 1 is the major course of one year, Architecture 2 is wood construction, and Architecture 3 is stone, brick and metal construction. All these subjects must be satisfactorily passed before admission may be had to the class in astronomy.

In case a course not required for graduation is selected by less than five students, the right to withdraw the same for the term is reserved.

Graduate courses of instruction are described under the various subjects, as in Architecture p. 131, as an aid in the selection of studies by graduate students. They are numbered upwards from 100. Other courses may often be arranged by the professors in charge to meet the special requirements of students. The subjects in which courses are announced for 1897-98 are as follows:

Agriculture, Architecture, Botany, Chemistry, Civil Engineering, Danish Language, Economics, Electrical Engineering, French, Geology, Greek, History, Latin, Mechanical Engineering, Municipal and Sanitary Engineering, Pedagogy, Philosophy, Psychology, Theoretical and Applied Mechanics, Zoölogy.

AGRICULTURE

1. Crop Production.—A course of study directed to the principles underlying successful practice in the economic production of crops on fertile lands.

a. The agricultural crops of the United States and their growth elsewhere; the choice of crops, varieties and seed; condition of germination

and of growth, physical and chemical, and their influence upon development.

b. Origin, constitution, and classes of soils; conditions and indications of fertility; a study of soil physics and comparison of successful methods with a view to securing the most favorable conditions of growth on fertile lands of various classes by means of cultivation, drainage, irrigation, or other process aside from the use of fertilizers—the manipulation of fertile soils. Text and laboratory work. *Spring and fall terms, full study.* Assistant Professor HOLDEN.

2. LIVE STOCK.—a. Origin of the breeds of domestic animals and their distinguishing characters as afforded by variation, favored by selection, and established by heredity; formation and adaptation of breeds for particular purposes and their value for grading; accompanied by critical study and practice in the art of judging both as to breed type and as to constitution and individual merit. Text, assigned readings, and practice on Saturdays. *Fall term, three-fifths study.* Professor DAVENPORT.

b. A brief study of the care and management of the live stock of the farm as to housing and feed, particularly directed to the economic sources of feeding stuffs, their equivalency and suitable preparation and proportions. Text, lectures, and assigned readings. *Spring term, two-fifths study.* Professor DAVENPORT.

3. STOCK BREEDING.—Variation, its extent and importance, both in nature and under domestication. How far inherent and how far induced by environment. Acquired characters and their inheritance. Correlated variation. Selection. Survival of the fittest. Possibility of fixing favorable variations. Effects of use and disuse. Intercrossing, first as stimulating, afterwards as eliminating, variations. Hybridism. Grading and its benefits. Breeding in line and inbreeding. Instinct and intelligence. The aim is to bring every known principle of reproduction to the assistance of the breeder's art, and to study the methods of successful breeders and their results. Lectures, reference reading, and practice in comparisons of individuals, and, as far as possible, of families and herds. *Fall term, full study,* Professor DAVENPORT.

Required: Botany 1; Zoölogy 3; Physiology 1.

4. FERTILITY.—Influence of fertilizers on the amount, character and composition of crops. Effects of particular crops upon fertility and upon each other, when grown in succession or together. Nitrogen and leguminous crops. The foregoing is made a basis for the study of conservation of fertility by the rotation of crops that the residues of one crop may be saved by the next and not washed away. Economic sources of the elements of fertility; fertilizers and manures, their valua-

tion and use under both extensive and intensive methods. *Spring term, full study.* Assistant Professor HOLDEN.

Required: Botany 1; Chemistry 1, 3a, 4

5. STOCK FEEDING.—Functional activities of the animal body and the end products of their metabolism. Foods are considered, first chemically, as affording the materials for these activities whether in construction of body tissues or of animal products, as meat, milk, etc.; second dynamically, as supplying the potential energy for these processes, and for labor, speed, etc. A study of the phenomena of animal nutrition from the economic standpoint in which animal activity is considered as an agent for transformation of energy and the resultant product as a source of profit. *Spring term, full study.* Professor DAVENPORT.

Required: Botany 2; Physics 2; Physiology 1; Zoölogy 3.

6. SOILS.—A critical study of the processes, chemical, physical, and biological that are active within the soil; influence of fertilizer and of crop upon the soil; natural sources of fertility as rain water, leguminous herbage; residues or the fate of fertility, whether natural or applied, as shown by a study of drainage waters; agency of bacteria and the conditions of their activity, and the cumulative effect of manures and of various agricultural practices. The whole is designed to develop the need for, and to fix the character of, such rotations and practices as shall tend to conserve fertility and to insure perpetual productiveness of soils. Lectures and reference readings. *Fall term, full study.* Assistant Professor HOLDEN.

Required: Botany 1; Chemistry 1, 3a, 4; Zoölogy 3, or Botany 2.

7. COMPARATIVE AGRICULTURE.—Influence of locality, climate, soil, race, customs, laws, religion, etc., upon the agriculture of a country and incidentally upon its people. One crop only and its effect, as rice; Indian corn in American agriculture and affairs. Varying conditions under which the same crop may be produced, as wheat. Statistical agriculture. Influence of machinery and of land titles, whether resting in the government, in landlord, or in occupant. Relation of agriculture to other industries and to the body politic. The agriculture of the world, its history and development. *Spring term, full study.* Professor DAVENPORT.

Required: Two years of University work.

8. AGRICULTURAL EXPERIMENTATION.—A systematic study of the work of Experiment Stations and experimenters in this and other countries, together with a critical study of correct principles and methods of experimentation, especially designed for such students as desire to fit themselves for work in original investigation in Experiment

Stations or elsewhere. *Winter term, full study.* Professor DAVENPORT.

Required: Agriculture 2, 4, 6.

9. DAIRYING.—Studies and practice on milk and its manipulations, including testing, separating, creaming, churning, etc., together with care of surroundings and the elements of successful manufacture of dairy products. *Winter term, full study.* Mr. FRASER.

10. INVESTIGATION AND THESIS.—There is required for graduation two terms of original investigation, the results and methods of which are to be embodied in the form of an acceptable thesis. The student may choose his subject along the line of any of the required studies of the course. The selection should be made before the opening term of the last year.

11. BUTTER MAKING.—Operation of, and studies in efficiency of, different separators in comparison with gravity methods of creaming under a variety of conditions. Influence of character of milk and its handling upon the quality of butter. Different methods of ripening cream and the effect upon churning and upon butter, together with extended practice in the manufacture and in scoring of butter. *Spring term, full study.* Mr. FRASER.

Required: Agriculture 9.

COURSES FOR GRADUATES

101. BREEDING.—Variation and heredity, their nature and phenomena as influenced by selection, environment, and use, with special reference to improvement of domestic animals.

102. PHYSIOLOGICAL CHEMISTRY AND THE NATURE OF FOOD.—A study of the functional activities of the animal body and the end products of their metabolism, as a basis for economical feeding.

103. COMPARATIVE AGRICULTURE.—The principles and practices of agriculture as influenced by soil, climate, tradition or the political, social, or religious condition of men.

ANTHROPOLOGY

1. This course, in general anthropology, begins with a study of the physical and psychical elements of ethnography. Theories as to the origin of man are discussed, and the various races of mankind are distinguished and described. Special attention is given to the historical and comparative study of customs, ceremonies, and rights, beliefs, and folklore of primitive peoples with reference to the common characteristics and fundamental instincts of mankind and to the origin and growth

of existing customs and social institutions. Lectures and prescribed reading. *Winter term, full study.* Assistant Professor DANIELS.

Required: A major or minor course in Economics, Geology, Psychology, or Zoölogy.

ANTHROPOMETRY

1. This is a short course of lectures and reading under the direction of the professor of physical training. It treats of physical measurements and their application in various departments of anthropological investigation. The time at which the lectures are given is subject to arrangement between the professor and students. For students in sociology (Economics 7 or 7a) the course will be counted for one-fifth of a credit. Assistant Professor EVERETT.

ARCHITECTURE

2. WOOD CONSTRUCTION.—Formulæ and data for computing dimensions and strength of columns, rods, beams, girders, etc., of wood or metal, are given and applied in the solution of various examples. Kinds of wood and uses in construction and decoration, seasoning, shrinkage, defects, and modes of protection from decay, are next studied. Construction and design of wooden floors, walls, ceilings, and roofs, are then treated, and afterwards joinery, doors, windows, bays, inside finish, cornices, wainscoting, etc. *Ricker's Wood, Stone, Brick, and Metal Construction; Jones's Logarithmic Tables. Fall term, full study.* Assistant Professor McLANE.

Required: General Engineering Drawing 1, 2, 3, 4.

3. STONE, BRICK, AND METAL CONSTRUCTION.—Foundations of stone, brick, concrete, and piles, are first studied, then materials employed in stone masonry, their uses, defects, qualities, and modes of preparation. Kinds of masonry and external finish. Tools for stone cutting and their use. Preparation of working drawings, with practical applications to the arch, the vault, and the dome. Brick masonry is next examined, with its materials and bonds. Manufacture and refining of cast iron, wrought iron, and steel are then studied, with the processes of pattern making, molding, casting, refining, rolling etc., and standard dimensions or sections to be obtained in the market. Special properties and value of each metal in a structure, designing of a line of columns in a tall mercantile building, and of beams, girders, and footings, together with the study of joints and connections, completes the work of the term. Same text-books as in fall term. *Winter term, full study,* Assistant Professor McLANE.

Required: General Engineering Drawing 1, 2, 3, 4.

4. SANITARY CONSTRUCTION.—Daily recitations or special lectures, with designs for special problems. The study of plumbing, trap ventilation, removal of wastes, construction of water closets, drains, and systems of water supply; sewage disposal. Water supply and fixtures in dwellings. *Gerhard's Drainage and Sewerage of Dwellings; Lectures on Sewage Disposal. Spring term, full study.* Assistant Professor McLANE.

Required: Math. 4; Physics 1, 3; Arch. 2, 3.

5. ROOFS.—Elements of graphic statics and applications of the science in the designing of trussed roofs. Composition and resolution of forces, equilibrium, reactions, moments, bending moments, and shears on beams, centre of gravity, and moment of inertia of forms of cross section. Construction of wooden and of metallic roofs is next studied, then the mode of computing loads on roof trusses, obtaining end reactions, drawing strain diagrams, and determining sectional dimensions of members, ending with the designing of joint connections. Numerous problems are solved, different types of trusses being worked out, and complete designs and details are made for one of wood and another of steel. *Ricker's Trussed Roofs. Ricker's Notes on Graphic Statics. Spring term, full study.* Assistant Professor McLANE.

Required: Math. 2, 4, 6; Theoretical and Applied Mechanics 1 and 2 or 4 and 5; Architecture 2, 3, 4 (except for students in civil and municipal engineering).

6. HISTORY OF ARCHITECTURE.—Two terms' work, usually divides at the beginning of the Romanesque style. Commencing with Egyptian and ending with modern styles, a careful study is made of the more important styles, successively examining historical conditions, local and inherited influences, structural materials and system, special ornaments, and purposes and designs of the buildings, with an examination of the most important typical examples of each style. Especial attention is given to ideas that might be useful or suggestive in American work, and to tracing the gradual evolution of architectural forms. This study becomes a very interesting branch of the history of human civilization. Two recitations and two illustrated lectures per week. References are made to numerous works, especially to Fergusson, Lubke, Durm, Reber, Gailhabaud, etc. *Ricker's Notes on History of Architecture, Fletcher's History of Architecture. Fall and winter terms, four-fifths study.* Professor RICKER.

Required: Architecture 2, 3, 4, 8, 9.

7. HISTORY OF ARCHITECTURE (Details).—Exercises in drawing at large scale the most important details of the Grecian, Roman, Early

Christian, Byzantine, Mohammedan, Romanesque, Gothic, and Renaissance styles. Drawings of details from books. *Notes and Sketches. Spring term, four-fifths study.* Associate Professor WHITE.

Required: Architecture 2, 3, 4, 6, 8, 9, 20.

8. ARCHITECTURAL DRAWING.—The term is devoted to the Five Orders of Architecture, and to architectural Shades and Shadows. A careful study of the proportions and details of the Orders is first made with lectures, recitations, and blackboard sketches from memory. *Ware's Five Orders; Millard's Pillet's Shades and Shadows. Spring term, full study.* Mr. TEMPLE.

Required: Gen. Eng'g Drawing 1, 2, 4; Arch. 20.

9. ARCHITECTURAL DRAWING—(Monthly Problems).—Preliminary instruction in rendering.—An entire day in each month during the sophomore and junior years will be devoted to a single problem in design, usually requiring the use of the Orders. The program will be made known at the beginning of the exercise, and the sketches must be completed and rendered in shade and color during the same day. A satisfactory grade in each exercise must be attained by the student before credit is given for this study, and this will only be done after the completion of this course. *Once a month, fall, winter, and spring terms, two years, 1 credit.* Mr. TEMPLE.

Required: General Engineering Drawing 1, 2, 3, 4; Architecture 8.

10. ARCHITECTURAL DRAWING—(Office Work).—Instruction in this study will be given in connection with Architectural Designing (Arch. 16).

11. ARCHITECTURAL SEMINARY.—Reports and discussions of original investigations of assigned topics in History of Architecture; reviews of books, abstracts of current technical journals, and other publications. *One session weekly during junior year.* One-fifth study per term. Taken with Arch. 6 and 7. Professor RICKER.

12. SUPERINTENDENCE, ESTIMATES, AND SPECIFICATIONS.—This study comprises several specialties in office work, not otherwise provided for, so far as they can be taught in a professional school.

Clarke's Building Superintendence and *Clarke's Architect, Owner, and Builder before the Law*, are carefully read with daily recitations.

In estimates the purpose of the instruction is to impart a knowledge of the usual methods of measurements of materials and work, the arrangement of computations in proper and convenient order, and an acquaintance with approximate prices of materials and labor, which vary in different localities. The methods of squaring, of cubing, of units, and of quantities, are each employed and illustrated by numerous examples.

In specifications, practice is obtained by writing out complete sets for buildings.

Dietzgen's Specification Blanks are employed. The standard *Contract of the American Institute of Architects* is used, being first carefully studied, then filled out for buildings. Bids, certificates, and other papers are made out. *Ricker's Lectures on Estimates. Winter term, full study.* Associate Professor WHITE.

Required: Architecture 2, 3, 4, 5, 6, 8, 9, 11; Theoretical and Applied Mechanics 1, 2, or 4, 5.

13. HEATING AND VENTILATION.—A full knowledge of the scientific theory and of the practice of warming and ventilating buildings is the purpose of this study. Commencing with the fuels and the production of heat, the student passes to the flow of gases through ajutages and pipes, applying these data to the calculation of the dimensions of air ducts and chimneys. The different systems of heating by furnaces, hot water, steam, etc., are next examined, with the details of each. The sources of impurity in the air and the requirements of good ventilation are then considered, with the different methods of ventilation by aspiration, by fans, etc., ending with the study of fans of different types. Numerous problems are given and heating plants designed. *Carpenter's Heating and Ventilating Buildings.* Lectures. *Fall term, full study.* Associate Professor WHITE.

Required: Mathematics 2, 4, 6; Architecture 2, 3, 4, 9, 15; Physics 1, 3; Chemistry 1; Theoretical and Applied Mechanics 1, 2, or 4, 5.

14. ARCHITECTURAL PERSPECTIVE.—The theory of perspective is taught with labor saving methods of abbreviating work and designing, in perspective itself is made a special aim, this being very useful to a draüghtsman in preparing sketches for clients. Methods of diagonals by triangles, and by coördinates are all used. Problems in angular, parallel, vertical, and curvilinear perspective, as well as in perspective shades and shadows, are solved, requiring original work as far as possible, so as thoroughly to prepare the student for any kind of work in perspective, instead of restricting him to the study and use of a single system. *Ware's Modern Perspective. Winter term, full study.* Mr. TEMPLE.

Required: General Engineering Drawing 1, 2, 3, 4; Architecture 2, 3, 4, 8, 9, 16, 17, 20.

15. REQUIREMENTS AND PLANNING OF BUILDINGS.—The lectures will be fully illustrated by plans sketched on the blackboard, which must be embodied in students' notes. Numerous problems in planning are given. References will frequently be made to the University library and the

architectural cabinet. Lectures. *Winter term, full study.* Associate Professor WHITE.

Required: Architecture 2, 3, 4, 8, 9, 17.

16. ARCHITECTURAL DESIGNING—(Residences).—Practice in office methods of preparing drawings and in the design and the study of the requirements for dwellings are the subject of this study. The work is limited to residences, since this class of buildings is likely to afford the graduate his first opportunity for independent original work. Lectures with blackboard sketches to be copied in students' notes. Problems in design worked out in rendered drawings. *Fall term, full study.* Associate Professor WHITE.

Required: Architecture 2, 3, 4, 8, 9, 17, 20.

17. ARCHITECTURAL DESIGNING—(Problems).—Each student makes sketches at small scale for assigned problems, which are criticised and modified until approved, then worked out in plans, elevations, and details, these drawings being rendered in shade or color as required. The object is to obtain as much practice in original design as possible; and in the making of rapid and effective sketches, suitable for submission to a client or employer. *Fall term, full study.* Mr. TEMPLE.

Required: Architecture 2, 3, 4, 7, 8, 9, 18, 20.

18. ARCHITECTURAL COMPOSITION.—A careful study is made of the laws of architectural design and of the results of experience embodied in the text-book, extended by numerous references to other authors. Commences with general principles, passing to an examination of proportions employed in most important styles, arrangement of plan, external design in general and detail, ceilings and interiors, arrangement of corridors, stairways and entrances, of internal courts, and of halls for large assemblages. Frequent problems in design afford practical applications of the principles. *Ricker's Translation of Architektonische Composition* (Handbuch der Architektur). *Spring term, full study.* Professor RICKER.

Required: Architecture 2, 3, 4, 6, 7, 14, 17, 20.

19. ARCHITECTURAL ENGINEERING.—This continues the study of graphic statics, commenced in "roofs," with applications to metallic roofs of wide span, roof trusses of curved or unusual form, and those supported by abutments and jointed. Spherical and conical trussed domes. Effect of moving loads on girders, the graphical analysis of the arch, vault, and dome, and of the Gothic system of vault and buttress. Construction and details of steel skeleton buildings. Practical applications are made to a series of problems in design for specified cases. *Ricker's Notes on Advanced Graphics; Freitag's Architectural Engineering; Ricker's*

Translation of Wittman's Arch and Vault. References to the works of Planat, Landsberg, DuBois, Clarke, Ott, Levy, Muller-Breslau, etc.; on Graphic Statics. *Spring term, full study.* Associate Professor WHITE.

Required: Math. 2, 4, 6; Theoretical and Applied Mechanics 1 and 2, or 4 and 5; Architecture 2, 3, 4, 5.

20. ARCHITECTS' ART COURSE 1. Prescribed.

Any three of Art and Design 1, 2, 3, 5, 6, 13. *Fall, winter, and spring terms.* Professor FREDERICK.

21. ARCHITECTS' ART COURSE 2. Optional.

Any three of Art and Design 5, 6, 7, 8, 10, 11, 13. *Fall, winter, and spring terms.* Professor FREDERICK.

Required: Architecture 20.

The Art and Design courses offered as Architecture 20 and 21 are varied to meet the special needs of students of architecture.

22. RENAISSANCE DESIGN.—*Fall term, full study.*

23. GOTHIC DESIGN.—*Winter term, full study.*

24. ROMANESQUE DESIGN.—*Winter term, full study.*

In each of these three courses a prescribed series of tracings of important details are to be made, and problems in design will be worked out as fully as time will permit. To acquaint the student with the methods of construction and motives in design peculiar to the style, a course of lectures will be given during each term. These will be fully illustrated by stereopticon views and blackboard drawings. A second term of work in Architecture 22 will be accepted in lieu of Architecture 23 or 24. Professor RICKER, Associate Professor WHITE, and Mr. TEMPLE.

Required: Architecture 2, 3, 4, 6, 8, 9, 11, 14, 15, 17, 18, 20.

25. COMPOSITION OF ORNAMENT.—This term is devoted to the study of historical ornament and to daily exercises in the designing of architectural ornament to decorate the structural forms usually found in practice. These designs will be charcoal or crayon sketches, drawings rendered in shade or color, or finished drawings. They will be made on as large a scale as possible, usually full size. Lectures. *Meyer's Handbook of Ornament. Spring term, full study.* Mr. TEMPLE.

Required: Architecture 2, 3, 4, 5, 6, 7, 8, 9, 11, 14, 15, 16, 17, 18, 20, 22, 23, 24.

COURSES FOR GRADUATES

Primary

101. Construction of Extensive Wooden Buildings, 1, 2, or 3 credits.

102. Recent Uses of Stone, Brick, and Terra Cotta in Architecture, 1, 2, or 3 credits.

103. Metallic Skeleton Buildings, 1, 2, or 3 credits.

104. Fire-resisting and fire-proof Buildings, 1, 2, or 3 credits.

105. Sanitation of Public and Semi-public Buildings, 1, 2, or 3 credits.

106. Researches on the Evolution of Architectural Styles, 1, 2, or 3 credits.

107. Higher Application of Graphic Statics, 1, 2, or 3 credits.

108. Heating and Ventilation of Large Buildings, 1, 2, or 3 credits.

109. Higher Studies in Architectural Design, 1, 2, or 3 credits.

110. Researches and Experiments in Applied Esthetics, 1, 2, or 3 credits.

111. Translation of an Approved Technical Architectural Work from the French or German, 1, 2, or 3 credits.

Secondary

112. Stereotomy Applied to American Problems, 1 credit.

113. Examinations of Heating and Ventilation of Buildings, 1, 2, or 3 credits.

114. Higher Workshop Practice, 1 credit.

115. Photography for Architects, 1 credit.

116. Methods of Reproducing Drawings, Specifications, etc., for Architects, 1 credit.

117. Higher Problems and Methods in Perspective, 1 or 2 credits.

118. Practice in Estimates, Specifications, etc., for Large Buildings, 1, 2, or 3 credits.

119. Higher Industrial Design, 1 or 2 credits.

120. Advanced Water-color Painting, 1 credit.

121. Study of Office Methods and Arrangements, 1 credit.

122. Any primary offered in the College of Engineering, 1 credit.

123. Indexing and Classification of Periodicals, Books, Data, and Technical Information for Architects and Engineers.

ART AND DESIGN

1. FREE-HAND DRAWING.—Lectures on free-hand perspective and practice in drawing geometric solids. Principles applied by drawing groups of common objects, as books, vases, chairs, tables, etc., casts of ornament; interiors, as the corner of the room; plants and flowers from nature. *Frederick's Notes on Free-Hand Drawing. Fall, winter, and spring terms, full study.* MR. LAKE.

2. CHIAROSCURO.—Study of chiaroscuro in charcoal, crayon, ink, pencil, and water color (monochrome) of geometric solids, still-life, casts of ornament, details of the human face and animal forms. Working

Drawings of Ornament. *Winter and spring terms, full study.* Professor FREDERICK and Mr. LAKE.

Required: Art and Design 1.

3. ARTISTIC ANATOMY.—Artistic anatomy of the human figure. Drawing from Rimmer's Art Anatomy and Julien's Études d'Après l'Antique. Outline drawing from the antique figure. *Duval's Artistic Anatomy. Spring term, full study.* Professor FREDERICK.

Required: Art and Design 1, 2.

4. THE ANTIQUE.—Shaded drawings in charcoal or oil from the antique figure. Sketching from costumed model. *Spring term, full study.* Professor FREDERICK.

Required: Art and Design 1, 2, 3.

5. PEN DRAWING.—Work with pen and ink arranged to suit the needs of students from all departments. *Fall term, full study.* Professor FREDERICK and Mr. LAKE.

Required: Art and Design 1.

6. MODELING.—Modeling in clay (*a*) details of human face, (*b*) copy of cast of ornament, (*c*) ornament from photograph. Casts are made of (*a*) at least one modeled piece, (*b*) arm, hand, or foot from nature, (*c*) foliage, fruit, or vegetable from nature. *Fall term, full study.* Professor FREDERICK.

Required: Art and Design 1, 2.

7. ADVANCED MODELING.—Modeling: (*a*) bas relief from antique figure, (*b*) anatomical rendering of an antique figure, (*c*) bust from the antique, (*d*) portrait head from nature in the round or relief. Casting: (*a*) piece mold, (*b*) sulphur mold, (*c*) gelatine mold. *Fall term, full study.* Professor FREDERICK.

Required: Art and design 1, 2, 6.

8. OIL PAINTING.—This course of painting in oil color is designed for beginners, and consists of two parts: (*a*) study in monochrome from still-life; (*b*) group, as a study for composition and color. *Winter term, full study.* Professor FREDERICK.

Required: Art and Design 1, 2, 3.

9. ADVANCED OIL PAINTING.—This is a continuation of course 8. It comprises a careful study of the methods followed in landscape painting. A number of time sketches of still-life are required. *Winter term, full study.* Professor FREDERICK.

Required: Art and Design 1, 2, 3, 8.

10. WATER-COLOR PAINTING.—Painting in water-color: (*a*) group, as a study for composition and color; (*b*) sketching from nature. *Spring term, full study.* Professor FREDERICK.

Required: Art and Design 1, 2.

11. Theory of Color.—In this course the student takes up the study of color as a means of interior and exterior decoration. Several original problems are required. *Winter term, full study.* Professor Frederick.

Required: Art and Design 1, 2.

12. Relation of Design to Manufacture.—This is primarily a course in industrial design arranged for special students of that subject. *Spring term, full study.* Professor Frederick.

Required: Art and Design 1, 2, 3, 10, 11.

13. Architectural Rendering.—This course is intended primarily for students of architecture. Perspectives are rendered in water-colors, and buildings sketched from nature. *Frederick's Architectural Rendering in Sepia. Spring term, full study.* Professor Frederick.

Required: Art and Design 1, 2.

ASTRONOMY

4a. Descriptive and General Astronomy—Minor course.—For students of any college of the University, pursuing work in astronomy.

The course aims to supply a general knowledge of the facts of astronomy, a clear conception of underlying principles and some acquaintance with the methods of arriving at these facts. Studies in the location of constellations and stars are made. Subjects considered in the class-room are the doctrine of the sphere, the nature, dimensions and other ascertainable characteristics of the heavenly bodies, with their mutual influences, such as arise out of their attractions, radiations, etc., etc. As a means to obtaining an acquaintance with astronomical methods, a sufficient number of elementary exercises, involving the use of astronomical instruments, are given, to enforce and fix in mind the teachings of the class room. In this course, practical questions are considered, though not made matters of chief importance. The literary and purely scientific features of the science, being assigned chief prominence. *Young's Elements of Astronomy*, also *Young's General Astronomy. Spring term, full study.* Associate Professor Myers.

Required: Mathematics 4.

A line of study, consisting of the three following courses, is offered for students who may desire to pursue the study of astronomy as a major subject.

4b. Descriptive and General Astronomy. — This course is arranged for students who may wish to devote to astronomy the time needed to make such a study of it as belongs to a general and liberal scholarship, and for those who wish to fit themselves well either for

instruction in high schools, academies, and colleges, or for a professional vocation. It presupposes course 4a, and is a continuation of it. While aiming to subserve the purposes of such students, this course is thought to be well suited to the need of students of the college of science who contemplate special work in the geological and biological sciences. The work of the recitation room is given by text-book and lectures. As much time as the degree of attainment of the student will warrant is given to laboratory work in the observatory. *Young's General Astronomy. Fall term, full study.* Associate Professor MYERS.

Required: Astronomy 4a.

5. COSMOGONY.—The chief aim of this course is to acquaint the student with the evidence both for and against the Nebular Theory. The role of the tides in cosmogonic development receives special consideration, and the present view, together with the testimony furnished by astronomy relating to the origin and cosmic history of the earth-moon system is recapitulated in detail to the epoch where astronomy yields to geology. A summary of the researches of Darwin and of Lord Kelvin is included. The course is given by lectures, aided by lantern slides and supplemented by collateral readings. *Clerke's System of the Stars, Winter term, full study.* Associate Professor MYERS.

Required: Astronomy 4b.

6. PRACTICAL ASTRONOMY.—This course, which is offered both for engineers and special astronomical students, is intended to give the student training in the use of instruments of precision. He is here required to obtain all the precision an instrument can be made to yield, and to do it with the minimum expenditure of care and time. As a subordinate matter, he will be introduced to instruments of a higher grade than those employed in ordinary surveying. A second purpose of the course is to train the student in the art of computing. Model forms of record and reduction for problems are set before him, and the advantage of compact and orderly arrangement of all work is strenuously insisted upon. As a concrete outcome of the above training, the student should acquire the ability to determine latitude, time, and azimuth with such instruments as are used in the ordinary practice of civil engineering. The course will be given partly by text-book, partly by lecture, and partly by laboratory work. An essential part of the work is the theory of astronomical instruments. *Campbell's Practical Astronomy. Spring term, full study.* Associate Professor MYERS.

Required: Astronomy 4a or 4b.

7. THEORY OF ORBITS.—This course embraces the following subjects: The formation and integration of the differential equations of

motion of a system of bodies and the derivation of the laws of undisturbed elliptic, parabolic, and hyperbolic motion. The actual computation of a cometary or planetary orbit is usually made. The theoretical parts of the work are given by lecture and text. *Watson's Theoretical Astronomy. Fall term, three-fifths study.* Associate Professor MYERS.

Required: Math. 2, 4, 6, 7, 8, 9, 10; Astronomy 4a or 4b, 6.

8. SPECIAL PERTURBATIONS.—An investigation of the various formulae and methods for finding the special perturbations of a heavenly body constitutes the chief subject of this course. The methods of Encke, Hansen, and of Variation of Parameters are developed and studied at length. As a necessary and preliminary adjunct to the course, an explanation and development of the formulae needed to integrate by the methods of mechanical quadrature is given.

Watson's Theoretical Astronomy. Winter term, three-fifths study. Associate Professor MYERS.

Required: Astronomy 7; Math. 14 and 16.

9. CELESTIAL MECHANICS.—The laws of motion of a system of bodies are here developed, the usual differential equations being treated. The two and three body problems with allied subjects, are first considered, after which follows a study of absolute perturbations by the method of variation of the canonic elements and other subjects of study such as are treated in *Tisserand's Mechanique Celeste. Spring term, three-fifths study.* Associate Professor MYERS.

Required: Astronomy 8.

10. ASTRONOMICAL SEMINARY AND THESIS.—The work of this seminary is on subjects either related to those considered in the senior courses, or connected with questions arising out of thesis investigations. This course is given in conjunction with Astronomy 7, 8, and 9, or with Mathematics 20, 21, and 22, according as the one or the other is current. It counts for two-fifths of a credit throughout the year, and must be taken with Astronomy 7, 8, and 9. or with Mathematics 20, 21, and 22, by students pursuing these courses as major subjects of study. Associate Professor MYERS.

BACTERIOLOGY

(See Botany 2, p. 136.)

BIBLIOGRAPHY AND LIBRARY ECONOMY

A short course of lectures upon this subject will be given by the Librarian to such students as elect it. Assistants in the library will usually be chosen from those who take these lectures. The time is at the convenience of instructor and students.

BOTANY

1. Morphology, Histology, and Physiology.— This course extends through the year, beginning in the fall, but the first term's work will be accepted as a minor course for those not making botany a specialty, the second and third terms together can be similarly credited. The full course is offered as an introduction to the methods and facts of botanical science, and, though complete in itself, is intended to serve as a foundation for further studies of plants and their affinities among themselves and their relations in nature. Laboratory and field work is supplemented and extended by lectures, the study of text, and by reference reading.

(a) The morphology and classification of illustrative groups of plants beginning with the lowest orders, constitute the work of the first term. Special attention is given to fresh water algæ and to fungi, but mosses, ferns, and flowering plants are included.

(b) During the second and third terms the general histology of plants is studied alternately with experiments in vegetable physiology. The inter-relations of structure and function of organs are thus made as serviceable as possible in gaining information and in connecting cause and effect. Students examine microscopical sections, make micro-chemical tests, draw figures, and write descriptive notes. In the physiological laboratory the studies include: the extent and causes of movements of fluids in the tissues; the absorption of nutriment materials; respiration; photosynthesis; growth; sensitiveness; variation and heredity, etc. *Fall, winter, and spring terms, full study.* Professor Burrill and Mr Hottes.

Required: Botany 6 or equivalent. Chemistry 1 and Art and Design 1, 2, must be taken with this course, if not had previously.

2. Bacteriology.—Bacteria and allied organisms are now known to play exceedingly important roles in nature, and in the daily life and well-being of man. This course is an introduction to existing knowledge upon the subject, and offers instruction in the modern methods of experimentation and research. The laboratory is well equipped for a limited number of students. Only those who can give extra time, when occasion demands, should undertake the work. Lectures and assigned reading accompany the laboratory work. Regular students in Municipal and Sanitary Engineering are allowed to do this work as a two-fifths course in the winter term, and without the specified requirements. *Fall term, full study.* Professor Burrill and Mr. Hottes.

Required: Botany 1 or 6, or Zoölogy 1 or 10; Chemistry 1.

3. Systematic Botany.—There is offered in this course an oppor-

tunity for advanced work upon selected groups of plants, including the collection and preservation of specimens, the identification and description of species, and studies upon systematic affinities. The course extends through two terms, and should be taken as laid down, though there is little essential relation of sequence between the work of the two terms.

The morphology and affinities of selected orders of flowering plants, herbaria and herbarium methods, studies upon the evolution of the vegetable world, are included in the work of the first term. The second term is devoted to cryptogamic plants, and the time is largely occupied in the determination and classification of species, together with studies upon life histories. Students who propose to take this term's work should arrange with the instructor at the beginning of the year or earlier, and should make collections for themselves. Mostly laboratory work. *Fall and winter terms, full study.* Professor BURRILL.

Required: Botany 1.

4. REPRODUCTION AND DEVELOPMENT.—Special experimental and research work in vegetable physiology, embryology, and life histories. Mostly laboratory work. *Spring term, full study.* Professor BURRILL and Mr. HOTTES.

Required: Botany 1.

5. INVESTIGATION AND THESIS.—Facilities are offered for original investigations upon selected subjects upon which may be based a thesis required for a degree. Special arrangement should be made with the instructor during the preceding year, or at least not later than the beginning of the year in which the work is to be taken. *Fall, winter, and spring terms, full study.* Professor BURRILL.

Required: Botany 1, 3, and 4, or an equivalent.

6. MINOR COURSE.—Lectures or recitations and laboratory work. This course is intended to serve as a preparation for courses in botany 1, 2, and 8; and to offer students who do not intend to pursue the subject more than one term, a chance to gain a general knowledge of the vegetable world, including the structure, physiological activities, kinds, and classification of plants, and to acquaint themselves with the methods of study and of instruction followed. The work is somewhat similar to that recommended for high schools. *Spring term, full study.* Professor BURRILL and MR. HOTTES.

8. ECONOMIC BOTANY.—A study of useful and harmful plants, especially those affecting agricultural and horticultural interests and of prominence in the arts. *Winter term, full study.* Professor BURRILL.

COURSES FOR GRADUATES

101. BIOLOGICAL BOTANY.—The preparation and study of material by histological methods; and experiment work with living vegetation in the laboratory and field in working out special problems in the development, physiology, and pathology of plants.

102. SYSTEMATIC BOTANY.—Critical and comparative studies of species included in chosen groups of spermaphytes or sporophytes, or from selected geographic areas, in connection with considerations of genealogic development, geographic distribution, and inter-related association.

103. BACTERIOLOGY.—Investigations upon morphologic and physiologic variation due to treatment; systematic studies upon the number, validity, and relationship of species; researches upon special saprophytic or parasitic kinds of bacteria and upon methods of favoring or combating their activities.

104. EVOLUTION OF PLANTS.—Observations and experiments upon plants and studies in related literature, in gaining information upon such topics as the following: The influence of environment, effects of self and cross fertilization, tendencies of variation, philosophy of selection, nature and laws of heredity.

CHEMISTRY

1. ELEMENTARY AND EXPERIMENTAL CHEMISTRY.—This course, which is designed for those who desire an elementary knowledge of chemistry, deals only with the fundamental, general principles of the science, the few typical elements and compounds which are studied being considered largely for the purpose of illustration.

The instruction includes lecture-demonstrations, recitations, and laboratory exercises. The laboratory work comprises a series of such experiments as serve best to illustrate the relations between the observed facts and the general principles, and to familiarize the student with the methods of chemistry. *Remsen's Introduction to Chemistry. Fall term, full study* Professor PALMER, Assistant Professor GRINDLEY and Mr. KEELER.

2. DESCRIPTIVE INORGANIC CHEMISTRY.—This course is required of all chemical students. It is mainly devoted to a study of the metallic elements, their classification, compounds, and chemical properties. The work is from lectures and assigned text, without laboratory work. *Remsen's Advanced Course. Winter and spring terms, three-fifths study.* Assistant Professor GRINDLEY.

Required: Chemistry 1.

3a. QUALITATIVE ANALYSIS.—This course includes a study of salts, their formation, solubilities, chemical reactions, etc. The periodic classification of the elements is made the basis for developing the principles of analysis. The work in the laboratory, after illustrating these principles, is occupied with the determination of base and acid constituents of a given number of unknown substances. *Winter term, laboratory work two hours daily, and lectures two hours per week, full study.* Assistant Professor GRINDLEY and Mr. KEELER.

Required: Chemistry 1.

3b. QUALITATIVE ANALYSIS, continued with more complex substances.—A comparative study of methods, difficult separations, problems in synthesis, etc. *Spring term, laboratory work two hours daily, and lectures two hours per week, full study.* Assistant Professor GRINDLEY and Mr. KEELER.

Required: Chemistry 1, 2.

4. ELEMENTS OF ORGANIC CHEMISTRY.—A course in organic chemistry, provided more especially for students who are not making a specialty of chemistry. The instruction is directed mainly to the consideration of the general characteristics and the mutual relations of some of the most important classes of carbon compounds, and the course constitutes a general introduction to the principles and the methods of organic chemistry. In the laboratory a few typical substances are prepared. *Remsen's Organic Chemistry. Spring term, full study.* Professor PALMER.

Required: Chemistry 3a.

5a. QUANTITATIVE ANALYSIS.—General principles and practices of gravimetric quantitative analysis, beginning with salts of definite composition. The purpose here is to gain facility and accuracy of manipulation, together with a knowledge of the principles involved in the best practice. Lectures and assigned text from *Fresenius's Quantitative Analysis* accompanying the laboratory work. *Fall term, full study.* Professor PARR and Mr. ROSE.

Required: Chemistry 3b.

5b. QUANTITATIVE ANALYSIS, CONTINUED.—This course includes volumetric analysis and the analysis of silicates; as feldspars, clays, etc. *Winter term, full study, laboratory work three hours daily.* Professor PALMER and Mr. ROSE.

Required: Chemistry 5a.

5c. EXAMINATION AND ANALYSIS OF FOODSTUFFS, MILK, BUTTER, ETC. SANITARY EXAMINATION OF AIR, OR ANALYSIS OF AGRICULTURAL PRODUCTS, MATERIALS, FERTILIZERS, ETC.—*Spring term, full study.*

Laboratory work is required three hours daily. Professor PALMER and Assistant Professor GRINDLEY.

Required: Chemistry 5b

6. TECHNOLOGICAL CHEMISTRY.—This is lecture-room work only, and comprises a study of technological chemistry as illustrated in those industries having a chemical basis for their principal operations and processes. Much use is made of the journals. *Winter and spring terms, half study.* Professor PARR.

Required: Chemistry 2, 3b.

7. PHYSICAL CHEMISTRY.—A course in physical chemistry, including thermo-chemistry, consisting mainly of laboratory work. It comprises determinations of vapor density, specific heat, depression of freezing point, elevation of boiling point, and calculation of molecular and atomic weights from the data thus obtained, and the use of calorimeter, polariscope, and other instruments, in determining such constants as serve in characterization or for quantitative estimation of chemical substances, or which serve as the basis of theoretical generalizations. Occasional lectures and the reading of assigned subjects accompany the laboratory work. *Fall, winter, or spring terms, full study.* Professor PALMER

Required: Chemistry 2, 5b; Physics 1, 3.

8. IRON AND STEEL ANALYSIS.—Methods for determination of all the constituents are studied, including both rapid and standard methods, especial attention being given to technical methods for determination of phosphorus and sulphur. *Spring term, full study.* Professor PARR and Mr. ROSE.

Required: Chemistry 5b.

9. ORGANIC CHEMISTRY.—The work of this course consists in the detailed discussion of the characteristics of several of the more typical and simple organic compounds, followed by the briefer consideration of most of the important classes of the derivatives of carbon. The instruction comprises lectures, recitations upon assigned subjects, and laboratory work. *Bernthsen's Organic Chemistry* is used as reference and text-book. The laboratory work includes the preparation of organic compounds in accordance with the directions given in *Gatterman's Practical Methods of Organic Chemistry*, and the ultimate analysis of the finished products. *Winter and spring terms, full study.* Professor PALMER and Mr. ROSE.

Required: Chemistry 2, 5a.

10. SANITARY ANALYSIS.—One term is devoted to the chemical examination of potable and mineral waters. Detection and estimation of

some of the most important poisons, organic and inorganic. *Fall term, full study.* Professor PALMER and Mr. ROSE.

Required: Chemistry 5a.

11. INVESTIGATIONS AND THESIS.—Candidates for graduation from the chemical courses "with a thesis" (p. 81) are required to devote at least three hours per day for two terms to the investigation of some selected chemical subject, the results of which are to be embodied in a thesis. The choice of subject should be made early in the year. It must be determined upon by consultation with the professors of chemistry before the first Monday in November. Between that time and the beginning of the winter term an index to the bibliography of the subject must be prepared and presented to the professor who is in charge of the investigation. In the research work the student is required to make full use of the various sets of journals, not only for the purpose of preparing himself for the experimental portion of the work and arranging a proper introduction to the thesis, but also as an essential means of extending his acquaintance with chemical literature and a drill in consultation of works of reference. *Winter and spring terms, full study.* Professor PALMER, Professor PARR, Assistant Professor GRINDLEY.

Required: Chemistry, 11 credits.

12. THEORETICAL CHEMISTRY.—A course of instruction which includes discussions of the principles and theories of general chemistry. *Ostwald's Outlines of General Chemistry. Winter term, three-fifths study; spring term, two-fifths study.* Professor PALMER.

Required: Chemistry 4 and 5a.

13. AGRICULTURAL CHEMISTRY.—A course of lectures upon the chemical principles and processes involved in agriculture, taken conjointly with laboratory practice in analysis of agricultural products and materials. *Winter and spring terms, full study.* Assistant Professor GRINDLEY.

Required: Chemistry 5a.

14. METALLURGY.—Especial attention is given to the effect of impurities in ores upon metallurgical processes and finished products. Fuels, refractory materials, and fluxes are described and their value and application explained. A series of lantern slides illustrating actual plants in operation together with specimens of furnace material and products are used in illustration. Much use is made of journals, annuals, and monographs setting forth the best practice. *Fall term, full study.* Professor PARR.

Required: Chemistry 5b.

15. (a) METALLURGICAL CHEMISTRY.—This course includes the wet assay of copper, lead, zinc, and other ores, arsenical and complex as

well as the simpler forms, also the analysis of finished metallurgical products; as, commercial lead, spelter, copper, etc.; during the last half of the term the work is occupied with the fire assay of lead, gold, and silver ores. Fluxes, reagents, and charges are studied in connection with various typical ores and practice given in use of the crucible and muffle furnaces and in the manipulations connected with fire assaying. *Fall term, full study.* Professor PARR and Mr. ROSE.

Required: Chemistry 5b.

(b) ELECTRO METALLURGY.—A study of the methods employed in the electrolytic separation and refining of metals, treatment of ores, etc. The laboratory work involves practice in actual separations, a quantitative check being made on all results. *Winter term, full study.* Professor PARR.

Required: Chemistry 5b.

(c) ELECTRO-CHEMICAL ANALYSIS.—A study of methods and practice in quantitative determination by electrolytic separation and deposition of metals and compounds. *Spring term, full study.* Professor PARR and Mr. ROSE.

Required: Chemistry 5b.

16. CHEMISTRY FOR ENGINEERS.—This course is arranged particularly for mechanical engineers. It involves the proximate analysis of coals, determination of calorific power, technical analysis of furnace gases, examination of boiler waters, etc. *Winter term, full study.* Professor PARR and Mr. KEELER.

Required: Chemistry 1.

17. INDUSTRIAL CHEMISTRY.—A laboratory course in the prepara tion of chemical products from raw materials. The manufacture and proving of pure chemicals, fractionation, and other processes of the manufacturing chemist. *Winter term, full study.* Professor PARR.

Required: Chemistry 5b.

18. SPECIAL ADVANCED COURSES.—Special laboratory courses as indicated below may be arranged for those competent to pursue them. From one-fifth to three credits will be allowed in the undergraduate courses for such work.

(a) Technical Gas Analysis, $\frac{1}{5}$ to 1 credit.

(b) Urinalysis, $\frac{2}{5}$ to 1 credit.

(c) Toxicology, $\frac{2}{5}$ credit to 2 credits.

(d) Metallurgical Chemistry, 1 to 3 credits. Professors PALMER and PARR.

19. SEMINARY.—Reports and discussions upon assigned topics from current chemical literature. One session each fortnight during the junior and senior years. *Two credits.* Professor PALMER and Mr. ROSE.

20. QUANTITATIVE ANALYSIS.—An elementary course intended especially for such students of other departments as desire some training in the process of quantitative analysis, but have not the time or the opportunity to enter the regular course in this subject (Chem. 5). The work may vary in character, to some extent, according to the need of the individual student. *Spring term, full study.* Professor PALMER and Mr. ROSE.

Required: Chemistry 3a.

21. PROXIMATE ORGANIC ANALYSIS.—One or two terms' work, mainly devoted to proximate analysis of organic compounds and mixtures of natural occurrence or of other origin. The work is both qualitative and quantitative, and includes determinations of the more important alkaloids, carbohydrates, acids, and other essential constituents of organic substances. *Dragendorf's Plant Analysis; Prescott's Organic Analysis; Allen's Commercial Organic Analysis*; *Lyon's Pharmaceutical Assaying. Winter or Spring term, full study.* Professor PALMER.

Required: Chemistry 4 and 5b.

22. PHOTOGRAPHY.—A half course in photography will be given in the spring term when called for by a sufficient number of students. *Spring term, half course.* Professor PARR.

COURSES FOR GRADUATES

101. Research work in organic chemistry.
102. Research work in general inorganic chemistry.
103. Research work in agricultural chemistry.
104. Investigations of heating power of fuels.
105. Research in metallurgical chemistry.
    - (*a*) Action of solvents in extraction of gold and silver from their ores.
    - (*b*) Methods of analysis of ores and products.

CIVIL ENGINEERING

1. LAND SURVEYING.—Areas and distances by chain, compass and plane table; U. S. public land surveys, including legal points involved in the reëstablishment of boundaries; magnetic variation and determination of true meridian. The students solve numerous problems in the field with instruments. To facilitate practice in surveying, an area has been specially prepared in which the difficulties of plane surveying are presented to the beginner as he is able to meet them, and where he is taught practical methods of overcoming them. All possible distances, directions, areas, and elevations are accurately known; and hence the instructor knows beforehand the precise result which the student should

obtain. This is an incentive to the student, and enables the teacher to show him the degree of accuracy attained, and also to point out errors. *Bellows and Hodgman's Surveyor's Manual. Fall term, full study.* Assistant Professor Pence.

Required: General Engineering Drawing 1, 2, 3, 4; Math. 4.

2. Topographical Drawing and Surveying. — Topographical drawing is given during the bad weather of the winter term. The student spends about half a term making the standard topographical symbols. During the spring term topographical surveying is taught, in which students solve problems with the plane table and the stadia, and make a topographical survey and plot the notes. This and course 3 must be taken together. *Winter and spring terms, half study.* Assistant Professor Pence.

Required: Civil Engineering 1.

3. Transit Surveying and Leveling.—Construction, adjustment and use of the transit and level; angles, inaccessible distances, and areas with the transit; profiles and contours with the level. Two weeks' time is given to practice in running railroad curves. The department is provided with the instruments necessary for the different branches of engineering field practice, including chains, tapes, compasses, plane tables, stadias, transits, levels, barometers, sextants, and solar transits. These instruments are in constant use by the students whenever the weather will permit. This and course 2 must be taken together. *Baker's Engineers' Surveying Instruments. Winter and spring term, full study.* Assistant Professor Pence.

Required: Civil Engineering 1.

4. Railroad Engineering.—In the field practice the class makes preliminary and location surveys of a line of railroad of sufficient length to secure familiarity with the methods of actual practice. Each student makes a complete set of notes, maps, profiles, calculations, and estimates. In addition to the mathematical theory of curves, turnouts, crossings, and the calculations of earth work, instruction is given by means of text-books, assigned reading, and lectures on the principles of economic location, particularly the effect of distance, grade, and curve upon operation and maintenance, and of methods of construction, equipment, and maintenance of way. *Godwin's Railroad Engineers' Field-Book. Fall term, full study; winter term, half study.* Assistant Professor Pence.

Required: Civil Engineering 1, 2, 3.

5. Masonry Construction.—Requirements and methods of testing stone, brick, cement, and lime; composition, preparation, and strength

of mortar and concrete; classification, construction, strength, cost of stone and brick masonry; foundations under water; theory of stability, cost, etc., of dams, retaining walls, bridge piers, bridge abutments culverts, and arches. The students have experiments in the masonry laboratory, in testing cement, mortar, stone, and brick. *Baker's Masonry Construction. Fall term, full study.* Professor BAKER.

Required: Theoretical and Applied Mechanics 1, 2; General Engineering Drawing 1, 2, 3, 4.

6. GEODESY.—Geodesy is taught by lectures and assigned reading. Studies are made of the instruments and methods employed in spirit, barometrical, and trigonometrical leveling; the apparatus and methods used in measuring base lines; the location and construction of stations; the methods of measuring the angles and reducing the triangulation; the principles of projecting maps; the methods employed in running parallels and meridians. The apparatus consists of a twelve-inch altazimuth instrument reading to single seconds, a precise level, aneroid and mercurial barometers, three wooden base rods; a comparator, a steel tape with level, thermometer, and spring balance. Problems are solved in barometrical, trigonometrical, and precise leveling, and in reading horizontal angles. *Winter term, half study.* Professor BAKER.

Required: Math. 4; General Engineering Drawing 1, 2, 3, 4; Civil Engineering 1, 3; Descriptive Astronomy 2.

10. SURVEYING.—For students in the courses of architecture, architectural engineering, electrical engineering, and mechanical engineering. Areas with chain and compass, U. S. public land surveys, and principles of reëstablishing corners; use of transit in finding distances, areas, and in laying out buildings; use of the level in finding profiles and contours. *Baker's Engineers' Surveying Instruments. Spring term, full study.* Assistant Professor PENCE.

Required: Math. 4; General Engineering Drawing 1, 3, 4; Physics 1.

12. BRIDGE ANALYSIS.—Instruction and practice are given in the computation of the stresses in the various forms of bridge trusses, by algebraic and graphical methods, under different conditions of loading. *Johnson's Modern Framed Structures. Fall term, full study.* Professor BAKER.

Required: Theoretical and Applied Mechanics 1, 2; Architecture 6.

13. BRIDGE DETAILS.—The student makes a tracing of a shop drawing of a bridge, and then makes a critical report upon each element of the design and computes the cost. Afterwards a comparative study is made of the several forms of details employed by leading designers. The apparatus consists of a series of full-sized joints and connections of

a modern railroad bridge, models, drawings, photographs, and lithographs. *Winter term, full study.* Professor BAKER.

Required: Civil Eng'g 12 and free-hand sketches with dimensions, showing full details of a bridge measured by the student.

14. BRIDGE DESIGN.—Each student designs a bridge, proportioning the sections and working out the details, and afterwards makes a complete set of drawings. *Spring term, full study.* Professor BAKER.

Required: Civil Engineering 12, 13.

15. TUNNELING.—This course, treating of methods of tunneling and mine attack, is given to students of civil engineering. The lectures treat first of the nature and use of explosives, compressed air, and power drills. The methods of tunneling are then explained and discussed, with their accompanying methods of timbering and walling. Attention is given to the sinking of shafts for the working of tunnels, or for the purpose of driving. The details of the duties of a tunnel engineer are made as clear and concise as possible. Students are required to make written reports upon the methods employed in particular tunnels. Some time is given in the earlier part of the course to the practice in boring wells, dredging, quarrying, and sub-aqueous blasting. *Winter term, half study.* Professor BAKER.

Required: Math. 2, 4, 6; General Engineering Drawing 1, 2, 3, 4; Mechanical Engineering 1, 16, 17; Chemistry 1; Physics 1.

16. ENGINEERING CONTRACTS AND SPECIFICATIONS.—A study is made of the fundamental principles of the law of contract, and of examples of the general and technical clauses of various kinds used in engineering specifications. *Johnson's Engineering Contracts and Specifications. Spring term, two-fifths study.* Professor BAKER.

Required: Civil Engineering 5, 12, 13; Municipal and Sanitary Engineering 2, 3.

17. RAILROAD STRUCTURES.—Instruction is given by lectures and references to standard authorities. Designs and working drawings are made of minor railroad structures, trestles, culverts, turntables, water tanks, engine houses, etc. Bills of material and estimates of cost are prepared. Attention is given to timber specifications and inspections, and to the various preservative processes. Current practice is studied by the examination of existing structures and by means of a collection of the standard drawings of leading railroads. *Winter term, full study.* Assistant Professor PENCE.

Required: Civil Engineering 4.

COURSES FOR GRADUATES

All primary unless otherwise stated.

Railway Engineering

101. Location and Construction.
102. Railway Track and Structures, and their Maintenance.
103. Yards and Terminals.
104. Motive Power and Rolling Stock.
105. Signal Engineering.
106. Railway Operation and Management.

Bridge Engineering

107. Bridge Designing.
108. Cantilever and Swing Bridges.
109. Metallic Arches.
110. Metallic Building Construction.
111. Roof Construction.
112. Stereotomy.
113. History of the Development of Bridge Building—Secondary.

Miscellaneous Subjects

128. Practical Astronomy.
129. Description of Work Done.
130. Critical Description of Engineering Construction.
131. Translation of Technical Engineering Work from French or German.
132. Any Primary in Theoretical and Applied Mechanics or Municipal and Sanitary Engineering.
133. Any Primary in Mathematics, Mechanical Engineering, or Electrical Engineering—Secondary.
134. Indexing of Civil Engineering Periodical Literature.

DRAWING, GENERAL ENGINEERING

1. Elements of Drafting.—This work is designed as a general preparation for drafting in all its branches. Its aim is, first, to teach the accurate and intelligent use of instruments and materials; second, to start the student upon his work with those neat and orderly habits which are invaluable to the competent draftsman.

The problems are arranged so as to be of the most practical benefit to the student, and, instead of being copies of similar problems, are designed to throw him upon his own ingenuity in applying his knowledge of principles learned. A part of the work consists of special problems

adapted to the wants of the students in each of the several engineering courses.

This course includes geometrical constructions; orthographic, isometric, and cavalier projections of models or from given data; simple working drawings; tracing; drawings finished in line shading and water colors—in all about thirty plates. Lectures and notes. *Fall term, full study.* Mr. PHILLIPS and Mr. VIAL.

2. DESCRIPTIVE GEOMETRY.—This term's work includes problems relating to the point, line, and plane; the generation and classification of lines and surfaces; planes tangent to surfaces of single and of double curvature; intersections, developments, and revolutions. The application of principles and methods in numerous and varied practical problems is a large part of the work. *Church's Descriptive Geometry. Winter term, full study.* Mr. PHILLIPS and Mr. VIAL.

Required: General Engineering Drawing 1.

3. LETTERING.—Plain and ornamental alphabets; free-hand and mechanical lettering; titles and title pages. *Lectures and Notes. Spring term, half study.* Mr. PHILLIPS and Mr. VIAL.

Required: General Engineering Drawing 1.

4. SKETCHING.—In perspective and orthographic projections. Architectural sketch plans and details; machines, machine parts, and mechanisms. Lectures and notes. *Spring term, half study.* Mr. PHILLIPS and Mr. VIAL.

Required: General Engineering Drawing 1.

ECONOMICS

1. PRINCIPLES OF ECONOMICS (Elementary Course).—This course is preliminary to all others. It is intended to serve as an introduction to the courses which follow and also to give a general survey of the field of the science for the benefit of those who cannot pursue the subject further. *Fall and winter terms, full study, four times a week.* Professor KINLEY.

2. PRACTICAL ECONOMIC PROBLEMS.—The purpose of this course is to give the student a general knowledge of some of the more important practical economic questions of the times. No text-book is used, but topics are assigned for investigation. and the results presented in debates, followed by general discussion. Written reports will, as a rule, be required from those who lead the debates, in addition to the oral presentation, and a written summary of each debate from each member of the class. *Spring term, full study, three times a week.* Professor KINLEY.

Required: Economics 1.

2a. MONEY AND BANKING.—In this course a study of the history and functions of money is followed by a critical study of the monetary and banking history of the United States and of such topics as the theory of prices, credit, government paper, etc. The method pursued is that of Economics 2, supplemented by lectures. *Spring term, full study.* Professor KINLEY.

Required: Economics 1. (Not given in 1897-98.)

3. PUBLIC FINANCE.—The purpose of this course is the historical, comparative, and critical study of the methods and purposes of public expenditure, and of the different sources of revenue, and also the discussion of public debts, their placement, refunding, and redemption. Those who enter the course must take both terms' work. Graduate students will receive credit as such for the course, provided they have had Economics 1 and 2, or their equivalent, do additional reading assigned in Wagner, Cohn, Beaulieu, and other writers, and also prepare one extended paper, or two shorter ones, on topics connected with the course. *Fall and winter terms, three-fifths study.* Professor KINLEY.

Required: Economics 1. (Not given in 1897-98.)

3a. FINANCIAL HISTORY OF THE UNITED STATES—This course begins with Hamilton's administration of the treasury. It deals with the growth and management of the national debt, and with the industrial expansion and the tariff history of the country. While the necessary logical separation is observed in the treatment of these subjects, their intimate connection is also emphasized and the economic development of the country as a whole is studied. The course may be taken as a graduate course on conditions similar to those laid down in 3. For graduate students the course will be purely investigative. They must, however, attend the lectures and report from time to time the results of their special investigations and summaries of their additional assigned reading. *Fall and winter terms, three-fifths study.* Professor KINLEY.

Required: Economics 1.

4. STATE AND LOCAL TAXATION IN THE UNITED STATES.—This course is a comparative study of taxation in the various states, and also in the cities so far as they present features of special interest. Special attention is given to taxation in Illinois. Those who take this course should take Political Science 8 at the same time; those in the Political Science group who are specializing in Economics *must* take it. *Spring term, three-fifths study.* Professor KINLEY.

Required: Economics 1.

4a. TAXATION.—The theory of taxation, modes of taxation, inci-

dence, etc., are carefully discussed. *Spring term, three-fifths study.* Professor KINLEY.

Required: Economics 3 or 3a. (Not given in 1897–98)

5. RAILROAD PROBLEMS.—This is a short course designed to familiarize the student with the problems of railway management in their economic, social, and legal aspects. Comparison is made of the development of railroad transportation and its regulation in Europe and the United States. Rates, financial methods of construction, competition, pooling, etc., are discussed, as is also the question of state ownership and management. *Spring term, full study, three times a week.* Professor KINLEY.

Required: Economics 1. The course is open, without the requirement in Economics, to students in the College of Engineering who have taken Civil Engineering 4

6. SOCIOLOGY.—In this course it is intended to study society in its normal structure. The theories of the nature of society, which have been advanced by various writers, are discussed in the light of the history of social institutions, and an effort is made to formulate some of the laws of social growth. *Fall and winter terms, two-fifths study.* Professor KINLEY.

Required: Economics 1 or some course in history or philosophy.

7. SOCIAL PATHOLOGY.—This is a course in "applied sociology," consisting of as detailed a study of the problems of pauperism and crime as the time will permit, together with a consideration of theories and methods of reform. *Spring term, two-fifths study.* Professor KINLEY.

8. ECONOMIC SEMINARY.—Advanced students will be formed into a seminary for investigation and for the study of current economic literature. Students who write their theses in economics must do so in connection with the seminary work. The course counts for two credits, but no credit will be given unless the whole course is taken. *Fall, winter, and spring terms, two hours once each week.* Professor KINLEY.

9. ECONOMICS OF AGRICULTURE.—This is a course especially prepared for the students of the Winter School in Agriculture (p. 114). It deals primarily with those portions of theoretical and practical economics which relate to agriculture. *Winter term, two-fifths study.* Professor KINLEY.

COURSE FOR GRADUATES

101. PRINCIPLES OF ECONOMICS (Advanced Course).—This course is a study of economic theory, beginning with the Physiocrats. Special attention is paid to recent development. It is based on Smith, Mill, Cairnes, Marshall, Roscher, Knies, Wagner, Böhm-Bawerk, Clark,

and Patten. It is open to seniors who have taken at least two years' work in Economics. The class will meet at least twice a week at the convenience of the instructor and students.

ELECTRICAL ENGINEERING

1. Electrical Engineering.—Short course of lectures with laboratory practice, intended for students in mechanical engineering and for others who require only a very general acquaintance with dynamo-electric machinery and its use for lighting and power purposes. *Spring term, full study*. Assistant Professor Swenson.

3a. Dynamo-Electric Machinery.—Lectures on theory of dynamo-electric machinery, particularly direct-current machines, with experimental study of the same in the dynamo laboratory. The course includes the theory and use of the instruments used in dynamo testing. *Fall term, four-fifths study*. Assistant Professor Swenson.

Required: Physics 4 and Electrical Engineering 11.

3b. Design of Electro-Magnets and Direct-Current Machinery.—Drafting with supplementary lectures on the practical construction of electro-magnetic mechanisms and dynamo-electric machines. Each student designs one or more electro-magnets for specific duty, and a direct-current dynamo machine, and prepares detailed drawings of the same. *Fall term, three-fifths credit*. Assistant Professor Esty.

Required: Physics 4 and Electrical Engineering 11.

4a. Alternating Currents and Alternating Current Machinery.—Lectures on the theory and application of alternating electric currents, with very complete experimental study of alternating current instruments and apparatus. There will be a short course on electromotive forces of higher frequency and the modern views of electricity. *Winter and spring terms, full study*. Professor Carman and Assistant Professor Swenson.

4b. Design of Alternating Current Machinery.— Drafting and lectures. Design and construction of alternating current transformers, alternators, and alternating current motors. Typical examples of alternating current apparatus are designed and detailed drawings made. *Winter term, three-fifths credit; spring term, one-half credit*. Assistant Professor Esty.

Required: Electrical Engineering 3b.

5. Photometry.—Lectures and Laboratory. Study of arc and incandescent lamps in connection with their use in electric lighting. *Winter term, two-fifths study*. Assistant Professor Swenson.

Required: Electrical Engineering 3.

6. TELEGRAPHY AND TELEPHONY.—Lectures and practice. This course includes the methods of telegraphy, the theory of the telephone, and telephone engineering with special reference to the construction, testing and protection of lines. Visits to the local telephone exchanges are made, and reports on the systems required. *Spring term, half study.* Assistant Professor ESTY.

Required: Electrical Engineering 4.

7. ELECTRO-METALLURGY.—Lectures and Laboratory. Theory of electrolysis and study of the use of electric energy in the electrolytic separation and refining of metals. Assistant Professor ESTY. Omitted for year 1897-98.

Required: Chemistry 1 and Electrical Engineering 3.

8. ELECTRIC LIGHTING.—Lectures and drafting. The subject of this course is the generation and distribution of electrical energy with special reference to electric lighting. It includes methods of wiring for arc and incandescent lighting; the discussion of fire insurance rules and regulations; the installation, operation, and economical management of central stations; use of accumulators, compensators, and other regulators; consulting engineering. A part of the instruction is to have the student make working plans, specifications, and estimates of a complete installation of a plant for a particular locality whose local conditions are known. *Winter term, full study.* Assistant Professor ESTY.

Required: Electrical Engineering 3, 4, 5.

9. ELECTRICAL TRANSMISSION OF POWER.—Lectures and drafting. The construction, equipment, and operation of electric railways and power stations; the utilization of water power; long distance transmission of electric power; the application of electric motors to general power distribution; consulting engineering. Visits to the plant of the local light and power company form a part of the instruction, and full reports on the installation are required. Plans, specfications, and estimates are prepared by each student for a power plant at some particular location. *Spring term, full study.* Assistant Professor ESTY.

Required: Electrical Engineering 8.

10. SEMINARY.—A weekly meeting of instructors and students is held in the department reading room for discussion of topics from the current journals of theoretical and applied electricity. Papers on any original work doing in the department also come up for discussion. *Fall, winter, and spring terms, once a week.* Professor CARMAN.

11. ELEMENTS OF DYNAMO-ELECTRIC MACHINERY.—A course of lectures introductory to the fuller courses of the fourth year, and re-

quired of third year students in electrical engineering. *Spring term, half study.* Assistant Professor SWENSON.

Required: Two terms of Physics 4.

COURSES FOR GRADUATES

Primary

101. Mathematical Theory of Electricity and Magnetism, 1, 2, or 3 credits.

102. Absolute Measurements in Electricity and Magnetism, 1, 2, or 3 credits.

103. Dynamo Electric Machinery, 1, 2, or 3 credits.

104. Electrical Transmission of Power, 1, 2, or 3 credits.

105. Electro-Metallurgy, 1, 2, or 3 credits.

106. Photometry, 1, 2, or 3 credits.

107. Calorimetry, 1, 2, or 3 credits.

108. Economy of Production and Utilization of Electrical Energy, 1 credit.

109. Consulting Engineering, 1 credit.

Secondary

110. Mathematics, 1, 2, or 3 credits.

111. Physics, 1, 2, or 3 credits.

112. Language, 1, 2, or 3 credits.

113. Chemistry, 1, 2, or 3 credits.

114. Architectural Engineering, 1, 2, or 3 credits.

115. Civil Engineering, 1, 2, or 3 credits.

116. Municipal and Sanitary Engineering, 1, 2, or 3 credits.

117. Mechanical Engineering, 1, 2, or 3 credits.

118. Translation of Technical Engineering Works, 1, 2, or 3 credits.

ENGLISH LANGUAGE AND LITERATURE

1. GENERAL SURVEY OF ENGLISH LITERATURE.—Prescribed for sophomore year in College of Literature and Arts. *Fall, winter, and spring terms, two-fifths study.* Assistant Professor KATHARINE MERRILL.

2. PROSE WRITERS OF THE EIGHTEENTH AND NINETEENTH CENTURIES.—*Fall, winter, and spring terms, three-fifths study.* Assistant Professor KATHARINE MERRILL.

3. POETRY OF THE NINETEENTH CENTURY.—*Fall, winter, and spring terms, three-fifths study.* Assistant Professor KATHARINE MERRILL.

4. PROSE WRITERS OF THE SIXTEENTH AND SEVENTEENTH CENTURIES.—*Fall, winter, and spring terms, two-fifths study.* Professor DODGE. [Not given in 1897-98].

4a. Non-Dramatic Poetry of the Sixteenth and Seventeenth Centuries. This course alternates with 4. *Fall, winter, and spring terms, two-fifths study.* Professor DODGE.

5. SHAKESPERE AND HISTORY OF THE DRAMA.—Primarily for graduates. *Fall, winter, and spring terms, three-fifths study.* Professor DODGE.

Required: English 1, 2, 3, and 4.

6. HISTORY OF ENGLISH CRITICISM.—Primarily for graduates. *Fall, winter, and spring terms, two-fifths study.* Professor DODGE.

Required: English 1, 2, 3, and 4.

7. SEMINARY: COMPARATIVE MODERN FICTION.—Open only to senior and graduate students. *Fall, winter, and spring terms, one-fifth study.* Assistant Professor KATHARINE MERRILL.

8. OLD ENGLISH (ANGLO-SAXON) GRAMMAR AND PROSE.—*Fall, winter, and spring terms, three-fifths study* Professor DODGE.

9. EARLY ENGLISH.—*Fall, winter, and spring terms, two-fifths study.* Professor DODGE.

10. OLD ENGLISH POETRY.—*Fall, winter, and spring terms, three-fifths study.* Professor DODGE.

Required: English 8.

11. FOURTEENTH AND FIFTEENTH CENTURY LITERATURE.—*Fall, winter, and spring terms, two-fifths study.* Professor DODGE.

Required: English 8 and 9.

12. HISTORY OF THE ENGLISH LANGUAGE.—One hour a week. *Fall, winter, and spring terms, two-fifths study.* Professor DODGE.

Required: English 8 and 9.

13. ICELANDIC.—*Fall, winter, and spring terms, full study.* Professor DODGE.

Required: English 8 and 9, or German 1.

14. OLD ENGLISH LEGAL CODES.—Special course for students of politics, economics, and history. As an introduction to the course Old English Grammar is studied so far as is necessary for a proper understanding of early phraseology. Primarily for graduates, but open to undergraduates having sufficient preparation. *Fall, winter, and spring terms, two-fifths study.* Professor DODGE.

Required: One year of history, economics, sociology, or English literature.

15. SEMINARY: METHODS OF ENGLISH TEACHING.—Open to senior

and graduate students. *Fall, winter, and spring terms, one-fifth study.* Professor DODGE and Assistant Professor MERRILL.

COURSE FOR GRADUATES

101. DANISH.—Full study through the year. Professor DODGE.

FRENCH

1. ELEMENTARY COURSE.—The course embraces grammatical study, pronunciation, exercises in composition, and conversation. Reading of representative works of modern authors, such as Halévy, Labiche, Daudet, Jules Verne, and others. *Fall, winter, and spring terms, full study.* Assistant Professor FAIRFIELD and MR. PATTERSON.

2. NINETEENTH CENTURY.—(1) The class will read works of Mérimée, George Sand, Balzac, Sandeau, Bourget, Hugo, and others. (2) Outlines of French literature. (3) Assigned readings and reports thereon. *Fall, winter, and spring terms, full study.* Assistant Professor FAIRFIELD.

Required: French 1 or 5.

3. SEVENTEENTH CENTURY.—(1) Readings from Molière, Corneille, Racine, Lafontaine, Boileau, de Sévigné, and others. (2) Study of French literature and civilization of the century. (3) Advanced composition. (4) Assigned readings. *Fall, winter, and spring terms, full study.* Assistant Professor FAIRFIELD.

Required: French 2.

4. EIGHTEENTH CENTURY.—(1) The course will consist of lectures in Frence, themes, and collateral reading. Reading of selected works of Voltaire, Montesquieu, Rousseau, Chénier, and Beaumarchais. (2) Assigned readings. (3) Themes in French upon subjects connected with the course. *Fall, winter, and spring terms, full study.* Assistant Professor FAIRFIELD.

Required: French 3.

5. SCIENTIFIC AND TECHNICAL FRENCH.—Similar to Course 1 for first two terms. In the spring term this class will be divided into sections for the study of scientific and technical French, suited to the demands of the several colleges, each student working in his own special line. Particular attention will be given to acquiring a technical vocabulary and to rapid reading. *Fall, winter, and spring terms, full study.* MR. CARNAHAN and MR. PATTERSON.

COURSES FOR GRADUATES

101. (a) OLD FRENCH READINGS.—Clédat, Les Auteurs Français du Moyen Age; Suchier, Aucassin et Nicolete; Gautier, La Chanson de

Roland. Translation and comparison with the modern idiom. Study of the laws of phonetic changes. Lectures upon Old French philology.

(b) A Systematic Study of Special Topics.—French poets of the sixteenth century. Malherbe; his school and his influence. Sacred eloquence of the seventeenth century.

GEOLOGY

1. Geology, Major Course.—(a) Dynamic Geology. The instruction given under this head is intended to familiarize the student with the forces now at work upon and within the earth's crust, modeling its reliefs, producing changes in the structure and composition of its rock masses and making deposits of minerals and ores. A series of localities is studied in which great surface changes have recently taken place, with a view to ascertaining the character of the forces producing such changes, and the physical evidence of the action of like forces in the past. The subject is taught by lectures, and is abundantly illustrated by maps, models, charts and views.

(b) Petrographic Geology. The instruction under this topic is given by lectures and laboratory work. The subjects included are the classification of rocks, the methods used in their determination, the conditions governing the formation of each species, the decompositions to which they are liable, and the products of these decompositions. Each student is supplied with a set of blowpipe tools and reagents, and a series of hand specimens covering all the common species of rocks.

(c) Historical Geology. The work on this subject is substantially an introduction to the history of geology as a science, and the developmental history of the leading geological doctrines. So far as may be done with the data in hand, an attempt is also made to trace the history of each geological period.

(d) Paleontology. The scheme of instruction in this subject places before the student the classification adopted for those organic forms occurring as fossils, together with the succession of the various groups that occur in the strata, with the cause, as far as known, for their appearance and disappearance. The student is required to familiarize himself with selected groups of paleozoic fossils, abundant illustrations of which are placed in his hands. The subject is presented in lectures and demonstrations, each group being considered in connection with its nearest living representative.

(e) Economic Geology. The final term of this course is devoted to a study of the uses man may make of geologic materials, the conditions under which these materials occur, and the qualities which render them

valuable. The instruction is given by text and readings from the various state and government reports, transactions of societies, and monographs in which these subjects are treated, as well as by demonstrations with materials from the collections of the University.

In dynamic and historical geology Dana's manual is used as a reference book, and in economic geology Tarr's Economic Geology of the United States. Petrography is pursued by means of a laboratory guide adapted from Rosenbusch, Zirkel, Roth, Teall, and others. In economic geology the manuals of Kemp and Tarr are used as texts. In paleontology Nicholson, Bernard, and Zittel are used for descriptions of the larger groups, Miller for general distribution, and the various state surveys for species. *Winter, spring, and fall terms, full study.* Professor ROLFE and Mr. MOSIER.

Required: Chemistry 3b; Mineralogy 1.*

2. INVESTIGATIONS AND THESIS.—For students who select a geological thesis guidance and facilities will be offered for individual investigations in the field and laboratory. *Fall, winter, and spring terms, full study.* Professor ROLFE.

Required: Geology 1.

3. ENGINEERING GEOLOGY (for engineers only).—It is the object of this course to bring together those parts of geology which will be of the greatest practical benefit to an engineer. The course will deal mainly with subjects connected with the origin, classification, and transformation of rocks, with the principles which govern the deposition and structure of rock masses; with the conditions under which the useful rocks and minerals occur, and the conditions which make them more or less valuable. The instruction is given by lectures and by demonstrations in the laboratory. *LeConte's Elements of Geology. Spring term, full study.* Professor ROLFE and Mr. MOSIER.

4. GENERAL GEOLOGY, MINOR COURSE.—This course includes a selection of such geological facts and theories as should be known to every intelligent person, with such discussion of them as the time will permit. The subjects treated will be fully illustrated, and opportunity will be afforded for some study of rocks and fossils. *LeConte's Elements of Geology. Winter term, full study.* Professor ROLFE and Mr. MOSIER.

COURSES FOR GRADUATES

101. PALEONTOLOGY.—A critical and comparative study of the fossils found in the rocks of Illinois.

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*Not required of students of the natural science group taking geology 1a and c as a minor. See page 96.

102. ECONOMIC GEOLOGY.—The effects which variations in the chemical composition and physical constitution of inorganic substances used in the arts have on the qualities of the manufactured product, and should have on methods of manufacture. A critical examination of the tests now employed in determining the qualities of building stones.

103. ILLINOIS GEOLOGY.—Glacial geology in relation to water supply of drift-covered regions. Dynamic and stratigraphic geology of the Ozark uplift in Illinois.

GERMAN

1. ELEMENTARY COURSE.—For students in the College of Literature and Arts and in the College of Engineering. Thomas's Practical German Grammar; Storm's Immensee, with Hatfield's Composition based on Immensee; Heyse's L'Arrabbiata, or other easy narrative prose. *Fall and winter terms, full study:* Mr. R. P. SMITH and Mr. G. W. SCHMIDT.

2. COMPOSITION AND READING.—Scheffel's Ekkehard or Freytag's Rittmeister von Alt-Rosen, Schiller's Wilhelm Tell or Maria Stuart; Lessing's Minna von Barnhelm and Goethe's Egmont or Iphigenie auf Tauris; Jagemann's Prose Composition and Syntax. *Fall, winter, and spring terms, full study.* Assistant Professor RHOADES and Mr. G. W. SCHMIDT.

Required: German 1 and 8.

3. CRITICAL STUDY OF CLASSICAL AUTHORS.—Translations and lectures; written reports in German on collateral reading. In 1897–98 this course may be elected as 3a; study of Lessing's Life and Works. In 1898–99, under the designation 3b, study of Schiller's Life and Works. *Fall, winter, and spring terms. Four times per week, full study.* Assistant Professor RHOADES.

Required: German 2 or an equivalent.

4. STUDY OF GOETHE.—Lecture's on Goethe's Life and Works, with translation and collateral reading. In 1897-98 this course may be elected as 4a for the study of Goethe's lyrics, prose writings, and dramas, especially those of his classical period. In 1898-99, under the designation 4b, study of Faust and the Faust problem. *Fall, winter, and spring terms, three-fifths study.* Assistant Professor RHOADES.

Required; German 3a or 3b; other students by special permission.

5. INTRODUCTORY SCIENTIFIC COURSE.—For students in the College of Science who do not offer German for entrance. Thomas's Practical German Grammar, with the reading of easy narrative prose. *Winter and spring terms, full study.* Mr. R. P. SMITH and Mr. G. W. SCHMIDT.

6. SCIENTIFIC READING.—For students in the College of Science. Translation of parts of Brandt and Day's German Scientific Reading and a review of German Grammar, with special drill in word-formation; translation of scientific monographs and collateral reading. For this latter work the students in the class will be divided, as far as practicable, into sections corresponding to their special departments of scientific work. Each of these sections will meet three times per week for recitation, and on the other two days appointments will be made with each individual for the purpose of guiding and helping in the prescribed collateral reading. This work will be suggested and approved for each section by the professors in the College of Science. *Fall, winter, and spring terms, full study.* Mr. R. P. SMITH.

Required: German 1 or 5 or entrance requirement.

7. ENGINEERING GERMAN.—For students in the College of Engineering. Translation of parts of Brandt and Day's German Scientific Reading with collateral reading of engineering monographs as suggested by the professors in the College of Engineering. *Spring term, full study.* Mr. R. P. SMITH.

Required: German 1 or 5 or entrance requirements.

8. PROSE NARRATIVE AND MODERN DIALOGUE.—For students in the College of Literature and Arts. Bernhardt's Novelletten Bibliothek or Jensen's Braune Erica; Freytag's Journalisten or Schiller's Der Neffe als Onkel. Harris's Prose Composition. *Spring term, full study.* Mr. G. W. SCHMIDT.

Required: German 1 or 5.

9. HISTORY OF GERMAN LITERATURE.—Lectures and assigned collateral reading of English books bearing on the subject. *Winter and spring terms, two-fifths study.* Professor RHOADES.

Required: German 2.

GREEK

1. SELECTIONS FROM HERODOTUS, with readings from Thucydides for comparison of style and historic method. Studies in Ionic etymology. Greek Prose once a week, with particular reference to the syntax of the verb. *Fall term, full study.* Professor MOSS.

2. ANDOCIDES DE MYSTERIIS, Lysias concerning the Sacred Olive Trunk; Demosthenes On the Crown. The development of oratory among the Greeks, by lectures and library references. *Winter term, full study.* Professor MOSS.

Required: Greek 1.

3. Demosthenes On the Crown. Aeschines against Ctesiphon. Continuation of winter term's work. *Spring term, full study.* Professor Morse.

Required: Greek 1, 2.

4. Xenophon's Memorabilia.—Lectures upon the work and influence of Socrates as a public teacher, with collateral readings upon assigned topics. *Fall term, full study.* Professor Moss.

Required: Greek 1, 2, 3.

5. Plato.— One entire dialogue and selections from others. Studies in the rhetoric and idiom of the author. Discussion of his philosophical views, so far as illustrated in the pieces read. *Winter term, full study.* Professor Moss.

Required: Greek 1, 2, 3, 4.

6. Æschylus's Seven Against Thebes, Sophocles' Philocteles. History of the Greek drama. The literary structure and technics of the plays named. *Spring term, full study.* Professor Moss.

Required: Greek 1, 2, 3, 4, 5.

7. Homer.—Two or three books of the Odyssey will be read by the class in common, and made the basis for some preliminary studies, when special readings in the text will be assigned to each student, and papers prepared by them upon suitable topics. Such papers will be read before the class and discussed. *Fall term, full study.* Professor Moss.

Required: Greek 1, 2, 3, 4, 5, 6.

8. Homer.—Continuation of course 7. *Winter term, full study.* Professor Moss.

Required: Greek 1, 2, 3, 4, 5, 6, 7.

9. Old Greek Life.—Course of semi-weekly lectures upon old Greek life, political, social, etc. For those who take the lectures and minimum reading, half study; for others, full study. *Spring term.* Professor Moss.

COURSES FOR GRADUATES

101. Herodotus.

102. Plato.

HISTORY

1. Mediæval and Modern European History.—Elementary, introductory course. *Fall, winter, and spring terms, three-fifths study.* Associate Professor Greene and Assistant Professor Hammond.

2. Historical Introduction to Contemporary Politics.—Constitutional and political tendencies of the nineteenth century, as represented by the political parties of England, the United States, France,

and Germany. *Fall, winter, and spring terms, two-fifths study.* Associate Professor GREENE and Assistant Professor HAMMOND.

3. AMERICAN HISTORY.—The origin and growth of the nation from the beginning of English colonization in America to the close of the Reconstruction period. *Fall, winter, and spring terms, full study. Students may, however, enter the course at the beginning of the winter term, omitting the colonial era.* Associate Professor GREENE.

Required: History 1 or 2.

4. ENGLISH CONSTITUTIONAL HISTORY.—*Fall, winter, and spring terms, three-fifths study.* Assistant Professor HAMMOND. [Omitted in 1897-98. Courses 4 and 10-11 will be given in alternate years.]

5. THE HISTORY OF GREECE AND ROME.—This course is intended particularly to meet the needs of students who intend to teach the classics and ancient history in secondary schools. *Fall, winter, and spring terms, three-fifths study.* Assistant Professor HAMMOND.

6. ENGLAND UNDER THE STUARTS.—The Puritan Revolution. *Winter term, three-fifths study.* [Omitted after 1895-96.]

7. MODERN EUROPEAN HISTORY.—Europe from the age of Louis XIV. to the present time. *Fall, winter, and spring terms, three-fifths study.* [Alternates with 12.] Associate Professor GREENE.

Required: History 1.

8. SEMINARY IN AMERICAN HISTORY.—Training in the use of the sources. *Fall, winter, and spring terms, two-fifths study.* Associate Professor GREENE. Course 8 is open to graduates and also to seniors of high standing who take or have taken History 3.

9. SEMINARY IN MEDIÆVAL HISTORY.—Topics to be arranged. Students who take this course will be expected to take History 10 also. *Fall, winter, and spring terms, two-fifths study.* Assistant Professor HAMMOND.

10. EUROPEAN HISTORY FROM 800 TO 1300.—A study of the period most fitly termed "mediæval," and of its characteristic institutions. *Fall and winter terms, three-fifths study.* Assistant Professor HAMMOND.

Required: History 1.

11. EUROPE IN THE FOURTEENTH AND FIFTEENTH CENTURIES.—The transition from the middle ages to the modern world. *Spring term, three-fifths study.* Assistant Professor HAMMOND.

Required: History 1.

12. THE BEGINNING OF MODERN EUROPE.—The Protestant Reformation and the religious wars. The Puritan Revolution in England. The rise of the Bourbon monarchy in France. *Fall, winter, and spring*

terms, three-fifths study. [Not given in 1897–98. Courses 7 and 12 will be given in alternate years.] Associate Professor GREENE.

Required: History 1.

COURSES FOR GRADUATES

101. Seminary in American History.

102. Seminary in Mediæval History.

HORTICULTURE

1. INTRODUCTORY COURSE.—This course is intended to give a general idea of horticultural work, such as all students in the College of Agriculture should have, and at the same time to prepare those who wish it for more advanced work. It is prefaced by a discussion of some of the essentials and difficulties of fruit growing.

(a) ORCHARDING.—1st. Pomaceous fruits: Apple, pear, quince. 2d. Drupaceous or stone fruits: Plum, cherry, peach and nectarine, apricot.

Each fruit is studied with reference to the following: Botanical matter, history, importance and extent of cultivation, soil, locations, fertilizers, propagation, planting, pruning and training, spraying, harvesting, storing and marketing, varieties, insect enemies, diseases, and profits. The grape and persimmon will also be briefly treated under this heading. Lectures, required readings, and practical exercises. *Fall term, two-fifths study.* Mr. BLAIR.

(b) PLANT PROPAGATION.—Methods of securing and perpetuating desirable varieties by self- and cross-fertilization, or hybridization, and selection. Propagation of plants by seed, cuttings, layering, grafting, budding, etc. Lectures, required readings, and laboratory work. *Winter term, two-fifths study.* Mr. BLAIR.

(c) SMALL FRUITS.—The strawberry, raspberry, blackberry, dewberry, currant, gooseberry, cranberry, and juneberry.

Each fruit is studied with reference to the points enumerated under (a) above. The grape is also again touched upon under this topic. Lectures, reference readings, and practical work. *Spring term, three-fifths study.* Mr. BLAIR.

2. VITICULTURE.—A comprehensive study of grape culture covering fully the points enumerated above under course 1, (a). Lectures, readings, and field exercises. *Fall and spring terms, two-fifths study.* Mr. BLAIR.

3. PLANT HOUSES.—Green houses, their construction and management. Lectures and practical demonstrations. *Winter term, two-fifths study.* Mr. BLAIR.

4. FORESTRY.—This course embraces a study of forest trees and their natural uses, their distribution, and their artificial production. The relations of forest and climate are studied, and the general topics of forestry legislation and economy are discussed. Lectures. *Fall term, two-fifths study.* Professor BURRILL.

5. LANDSCAPE GARDENING.—Ornamental and landscape gardening, with special reference to the beautifying of home surroundings. The subject is treated as a fine art, and will be illustrated. *Fall term, three-fifths study.* Professor BURRILL and Mr. BLAIR.

6. ECONOMIC BOTANY.—See Botany 8 for description of this course (p. 137). *Winter term, full study.* Professor BURRILL.

7. VEGETABLE GARDENING.—Kitchen and market gardening, embracing a study of the following: Asparagus, beans, beet, brussells sprout, cabbage, cauliflower, and broccolli, celery, cress or pepper grass, cucumbers, egg plant, lettuce, mushroom, musk melon, onion, parsley, peas, pepper, pumpkin, radish, rhubarb, spinach, squash, sweet potato, tomato, and water melon; each studied with reference to the points enumerated under course 1, (a). Lectures, required readings, practical work. *Spring term, full study.* Mr. BLAIR.

8. FLORICULTURE.—The study and management of conservatory and house plants. *Fall, winter, and spring terms, two-fifths study.* Mr. BLAIR.

9. PRACTICAL HORTICULTURE.—A course giving a practical training for those students intending to follow horticulture as a business. *Fall, winter, and spring terms, two-fifths study.* (Six hours a week required). Mr. BLAIR.

10. SPECIAL INVESTIGATIONS AND THESIS WORK.—For graduates and advanced students. *Fall, winter, and spring terms, two-fifths study.* Professor BURRILL.

[Courses 8 and 9 will not be offered for 1897-8.]

ITALIAN

1. GRAMMAR AND READING.—Grandgent's Italian Grammar, reading of modern authors; Dante's Divina Commedia, outlines of Italian literature. *Fall, winter, and spring terms, full study.* Assistant Professor FAIRFIELD.

LATIN

1. LIVY.—Selections from the XXI. and XXII. books. Latin composition based on the text. The main object of this course is to secure accuracy in pronunciation and facility in reading easy Latin. *Fall term, full study.* Professor BARTON.

2. PLINY.—Selected letters. The life of a Roman gentleman under the early empire. Outlines of Roman Literature. *Winter term, full study*. Professor BARTON.

Required: Latin 1.

3. TERENCE.—Phormio and Adelphi. Roman comedy, lectures. Hayley's introduction to the verse of Terence. Scenic antiquities. *Spring term, full study*. Professor BARTON.

Required: Latin 1, 2.

4. HORACE.—Odes. Roman lyric poetry. Lectures and assigned readings. *Fall term, full study*. Professor BARTON.

Required: Latin 1, 2, 3.

This course will be given in alternate years with course 5.

5. HORACE.—Satires and Epistles. Especial reference to the private life of the Romans in the time of Augustus. *Fall term, full study*. Professor BARTON. [Not given in 1897–98.]

Required: Latin 1, 2, 3.

6. TACITUS.—Agricola and Germania. The Agricola will be considered both from the standpoint of biography, and also as an introduction to the constructions and style of Tacitus. The Germania, in connection with Cæsar's account of the customs of the Gauls and Germans. *Winter term, full study*. Professor BARTON.

Required: Latin 1, 2, 3.

7. PLAUTUS.—Captivi and Trinummus. Assigned readings and themes on the leading characters of the plays and on the social conditions indicated. *Spring term, full study*. Professor BARTON.

Required: Latin 1, 2, 3.

8. THE ROMAN HISTORIANS.—Readings from Cæesar, Sallust, Livy, and Tacitus. The aim of this course is partly grammatical, and is partly devoted to a study of differences in style and method of treating historical themes. *Fall term, full study*. Professor BARTON.

Required: Latin 1, 2, 3.

9. JUVENAL AND MARTIAL.—Selected readings. Roman satire. Society in the first century. Lectures and themes. *Winter term, full study*. Professor BARTON.

Required: Latin 1, 2, 3.

10. TEACHERS' COURSE.—A study and discussion of the aims and essentials of preparatory Latin, methods of presentation, and difficulties to be met. Students will do the work of a preparatory class and at intervals will take charge of the recitation. *Spring term, full study*. Professor BARTON.

COURSES FOR GRADUATES

101. CATULLUS.—Selected readings. The position of Catullus and Horace in lyric poetry; the indebtedness of Horace and Vergil to Catullus.

102. THE ELEGIAC POETS.—Selections from Ovid, Propertius, and Tibullus.

103. ROMAN LITERARY PROSE STYLE.—Selected readings to trace in a connected manner the characteristics of prose style under the Republic, during the time of Augustus, and under the early Empire.

MATHEMATICS

1. ADVANCED ALGEBRA.—For students in the Colleges of Agriculture, Science, Literature and Arts. Functions and their notations; series and the theory of limits; imaginary quantities; general theory of equations. Topical reviews of all preceding algebraic processes. *Wells's College Algebra. Fall term, full study, and winter term, one-fifth study.* Mr. KETCHUM and Mr. MILNE.

2. ADVANCED ALGEBRA.—For students in the College of Engineering. Principles of small practical value are subordinated to those of higher utility. Accuracy and dispatch in the use of principles are continually emphasized. A topical review of the principles of elementary algebra is made from time to time. This review is sometimes made by requiring students to solve practical problems illustrative of principles not well understood. Some of the most important subjects in which instruction is given are functions and their notation; the progressions; permutations and combinations; probabilities; convergency and divergency of series; summation of series; undetermined coefficients; theory of limits; logarithms and general theory of equations. *Wells's College Algebra. Fall term, full study, winter term, one-fifth study.* Mr. BRENKE.

3. TRIGONOMETRY.—For students in the Colleges of Literature and Arts, Science, and Agriculture. Plane Trigonometry; fundamental relations between the trigonometrical functions of an angle or arc; relations between the functions of different angles or arcs; construction and use of tables; solution of triangles; angles as functions of sides, and sides as functions of angles; applications. *Bowser's Trigonometry. Winter term, four-fifths study.* Mr. KETCHUM and Mr. MILNE.

Required: Math. 1.

4. TRIGONOMETRY.—For students in College of Engineering. The ratio system is studied chiefly, but the necessary connection between it and the line system is carefully proved and illustrated. Students are

frequently required to demonstrate the same proposition, using first the line values, then the ratio values of the functions. The subjects taught are the circular measurement of angles, general formulas of plane trigonometry, relations between functions of multiples of 90° plus or minus an angle, solution of right and oblique plane triangles, etc. *Bowser's Trigonometry. Winter term, four-fifths study.* Mr. BRENKE.

Required: Math. 2.

5. CONIC SECTIONS (Geometrical Method).—Definitions and general properties of the ellipse, hyperbola, and parabola, curvature of the conic sections; elements of analytical geometry. Properties and relations of the point and right line in a plane, and of the conic sections. *Cockshott & Walters's Geometrical Conics. Spring term, full study.* Mr. MILNE.

Required: Math. 1, 3.

6. ANALYTICAL GEOMETRY.—The aim is to acquaint the student with analytical methods of investigation and to familiarize him with some of the most recent developments in synthetic geometry; to make him more skilful in the use of algebraic processes, especially as a means of demonstrating geometric properties of loci. Subjects considered are the elementary theory of the point and right line in a plane; use of abbreviated notation; elementary theory of the conic sections, their equations and properties developed analytically; poles and polars; synthetic geometry of the circle, and the discussion of the general equation of the second degree. *Wood's Coördinate Geometry. Spring term, full study.* Mr. BRENKE.

Required: Math. 2, 4.

7. DIFFERENTIAL CALCULUS.—Variables and functions; limits and infinitesimals; differentials and derivatives; differentiation of explicit functions, implicit functions, and functions of several variables; derivatives of higher orders; successive derivatives, developments in series; maxima and minima of functions; indeterminate forms; plane curves, tangents, and normals; asymptotes, singular points, and curve tracing; theory of envelopes, of curvature, of evolutes, and of involutes. *Byerly's Differential Calculus. Fall term, full study.* Professor SHATTUCK.

Required: Math. 2, 4, 6.

8. ADVANCED ANALYTICAL GEOMETRY.—Position and direction in space; direction and angles; projections of lines, direction cosines; transformation of coördinates; the general and normal equations of the plane; also in terms of the intercepts; the plane satisfying given conditions; relations of planes to one another; perpendicular distance to a plane; bisectors of dihedral angles; symmetrical equations of a straight

line; condition that a line shall be parallel to a plane; equation of the common perpendicular to two given lines; condition of intersection; a quadric surface; conjugate axes and planes; classes of quadrics; tangent and polar lines, and planes to a quadric; surfaces derived from generating curves; the equations of the helix; the conoid. *Wood's Coördinate Geometry. Winter term, full study.* Professor SHATTUCK.

Required: Math. 2, 4, 6, 7.

9. INTEGRAL CALCULUS.—Elementary forms of integration; integrals immediately reducible to the elementary forms; integration by rational transformations; integration of irrational algebraic differentials; integration of transcendent functions; definite integrals; successive integration; differentiation under the sign of integration; integration by means of differentiating known integrals; double integrals; triple and multiple integrals; product of two definite integrals.

Rectification and quadrature; the parabola, the ellipse, the cycloid, the Archimedean spiral, the logarithmic spiral, the limniscate, the cycloid, quadrature of surfaces of revolution and of surfaces in general; cubature of volumes; the sphere, the pyramid, the ellipsoid, any solid of revolution, and of volumes in general. *Byerly's Integral Calculus Spring term, full study.* Professor SHATTUCK.

Required: Math. 2, 4, 6, 7, 8.

10. THEORY OF EQUATIONS —The development of the general properties of equations; relations of the roots and the coefficients of an equation, with applications to symmetric functions; transformation of equations; solution of reciprocal and binomial equations; algebraic solution of cubics and biquadratics; properties of derived functions; the limits and separation of the roots of equations; the solution of numerical equations of the nth degree. *Burnside and Panton's Theory of Equations. Fall term, full study.* Associate Professor TOWNSEND.

Required: Math. 2, 4.

11. THEORY OF DETERMINANTS.—The origin and notation of determinants, properties of determinants, determinant minors, multiplication of determinants, determinants of compound systems, determinants of special forms—Jacobians, Hessians, Wronskians—with applications to algebra, including linear transformations, and to analytic geometry. *Hanus's Theory of Determinants,* supplemented by lectures. *Winter term, full study.* Associate Professor TOWNSEND.

Required: Math. 6, 7, 10.

12. THEORY OF INVARIANTS.—The course will cover the general development of the theory of invariants, both from the geometric and from the algebraic side. Applications of invariants will be made to sys-

tems of conics and to higher plane curves. Lectures with collateral reading. *Fall term, three-fifths study.* Associate Professor TOWNSEND. [Not given in 1897–98.]

Required: Math. 7, 10, 11.

13. THEORY OF FUNCTIONS.—By way of introduction, considerable attention will be given to the geometric representation of the complex variable, including Argand's diagram, conformal representation, and harmonic ratios, and bilinear transformation. This will be followed by the development of the theory of infinite series, algebraic and transcendental functions, integration of uniform functions, Riemann's surfaces, introduction to elliptic functions, etc. *Durége's Theory of Functions and Collateral Reading. Fall, and winter terms, three-fifths study.* Associate Professor TOWNSEND.

Required: Math. 7, 8, 9, 10.

14. METHOD OF LEAST SQUARES.—The object of this course is to present the fundamental principles of the subject, in a manner so plain as to render them intelligible and useful to students of astronomy and engineering. The following subjects will be studied: Law of probability and error, adjustment of observations, precision of observations, independent and conditioned observations, etc. *Merriman's Least Squares. Fall term, two-fifths study.* Associate Professor MYERS.

Required: Mathematics 7, 8, 9.

15. SEMINARY AND THESIS.—*Fall, winter, and spring terms, two-fifths study.* Associate Professor TOWNSEND.

16. DIFFERENTIAL EQUATIONS.—This subject is designed for students in the courses of engineering and of mathematics and astronomy. It will embrace the following topics: General linear equations with constant coefficients, special forms of differential equations of higher order, integration of series, etc. *Johnson's Differential Equations. Winter term, three-fifths study. Spring term, two-fifths study.* Associate Professor MYERS.

Required: Math, 7, 8, 9.

17. ANALYTIC GEOMETRY OF SPACE.—A general review will be given of the position of the plane and the right line in space and the more general properties of surfaces of the second degree. To this will be added the classification and special properties of quadrics, and a brief introduction to the theory of surfaces in general. *Chas. Smith's Solid Geometry. Spring term, full study.* Associate Professor TOWNSEND.

Required: Math. 7, 8, 9, 11.

18. HIGHER PLANE CURVES.—This course is designed to cover the general theory of algebraic curves, together with the application of the

theory of invariants to higher plane curves. Special study will be made of curves of the third and fourth order. *Lectures with collateral reading. Winter term, three-fifths study.* Associate Professor TOWNSEND. [Not given in 1897–98.]

Required: Math. 10, 11, 12.

19. SOLID AND SPHERICAL GEOMETRY.—This is a course prescribed for the students in the College of Literature and Arts. *Spring term, full study.* MR. MILNE.

20. CALCULUS OF VARIATIONS.—This course has for its aim merely to acquaint the student with those elements of the science which are most needed in the study of the higher subjects of mathematical astronomy and physics. *Carll's Calculus of Variations. Fall term, three-fifths study.* Associate Professor MYERS.

Required: Math. 2, 4, 6, 7, 8, 9, 10, 11, 16.

21. SPHERICAL HARMONICS.—In this course, a thorough study is made of so much of this subject as is of interest to an astronomer. It is introduced by a short course of lectures and study of certain trigonometric series. Fourrier's Theorem for developing any function of a variable in a series proceeding in sines and cosines of multiples of the variable is derived and the limitations of its validity investigated. This is followed by the study of Lagrange's, Laplace's, and Larne's functions and their applications to astronomical and physical problems. *Byerley's Fourrier's Sines and Spherical Harmonics. Winter term, three-fifths study.* Associate Professor MYERS.

Required: Math. 2, 4, 6, 7. 8, 9, 10, 11, 14, 16.

22. POTENTIAL FUNCTION.—The potential function is defined and its properties derived and discussed. The potential of various bodies; such as of a wire, a spherical shell, a sphere, ellipsoid of revolution, etc., is computed. Poisson's and Laplace's Equations are derived and discussed. Green's Propositions with kindred and similar subjects are handled. *Pierce's Newtonian Potential Function. Spring term, three-fifths study.* Associate Professor MYERS.

Required: Math. 21; Astronomy 6.

23. MODERN GEOMETRY.—This course will include in general a consideration of homogeneous co-ordinates duality, descriptive and material properties of curves, anharmonic ratios, homography, involution, projection theory of correspondence, etc. *Scott's Modern Analytic Geometry. Fall term, three-fifths study.* Associate Professor TOWNSEND.

Required: Math 7, 8, 10, 11.

24 ALGEBRAIC SURFACES.—In this course will be considered the application of homogeneous co-ordinates and the theory of invariants

to geometry of three dimensions, and also the general theory of surfaces, together with the special properties of surfaces of the third and fourth order. *Lectures with collateral reading. Fall term, three-fifths study*. Associate Professor TOWNSEND. [Not given in 1897–98.]

Required: Math. 12, 17, 18.

MECHANICAL ENGINEERING

1. SHOP PRACTICE.—In the shops the students are advanced in the work as fast as their ability will permit. The work, as far as possible, is carried along the same lines as those practiced in our leading commercial shops. The exercises are, in general, chosen from parts of machines under construction, being carefully graded according to the skill of the student. The policy of the department is to give the student every possible advantage, and to teach him to produce accurate work in the shortest possible time. Beginning with the care and use of the tools with which he is to work, the student is carried through the various operations of machine-shop practice. The following outlines the work in the several shops as laid down for the regular classes, the work of the several terms being subject to transposition.

First Term, Wood Shop.—Primary exercises relating to the use and care of tools, and the construction of a series of exercises in joint work and turning, preparatory to pattern making,

Second Term, Wood Shop.—The work of this term is devoted largely to the making of patterns and core boxes, particular attention being given to the principles of molding.

Third Term, Foundry.—The student here receives instruction in the management of the cupola and molding, including green and dry sand core making. *Fall, winter, and spring terms, full study*. Mr. CURTISS and Mr. WILSON.

2. SHOP PRACTICE.—First Term, Forge Shop.—Instruction is given in the forging and welding of iron and steel, special attention being given to the forging and tempering of lathe and planer tools, annealing and case hardening.

Second Term, Machine Shop.—During this term the student receives instruction in chipping, filing, and elementary lathe and planer work.

Third Term, Machine Shop.—Lathe, planer, drill, shaper, or bench work. *Fall, winter, and spring terms, half study*. Mr. CLARK and Mr. JONES.

3. POWER MEASUREMENTS.—This is the beginning of the work in the mechanical engineering laboratory, and is intended for students taking the mechanical engineering course. A study is made of the use

and construction of the steam engine indicator. The measurement of power developed by the steam engine under different conditions is made a prominent part of the work. The method of applying friction brakes and measuring transmitted power is also taken up. *Fall, winter, and spring terms, half study.* Mr. WOOD.

Required: Mechanical Engineering 1, 2; Math. 7, 8, 9.

4. ELEMENTS OF MACHINE DESIGN.—The basis of this work is found in *Klein's Elements of Machine Design.* A series of plates 26 x 40 inches is constructed, covering a wide range of machine parts. There are 334 formulas, empirical and rational, the use and derivation of which are explained. By means of a large number of practical examples, sufficient drill is obtained in using them to enable the student to make the calculations required when designing such parts of machines as screw threads, nuts and bolts, rivets and riveted joints, keys, connecting-rod ends, belts, pulleys, stepped cones, shafts, end and neck journals, pivots, and bearings for rotating pieces. Problems relating to gearing are taken up, such as exact and approximate methods of laying out profiles of teeth, proportions of teeth for strength and durability; circular and diametral pitch; cast and cut gears; sizing of blanks; gear cutters; wooden teeth; spur, bevel, and worm gearing, and proportions of worm gearing for highest efficiency. *Kent's Mechanical Engineers' Pocket-book; Low and Bevis's Machine Design; also Unwin's Machine Design. Fall, winter, and spring terms, half study.* Mr. GOODENOUGH.

Required: General Engineering Drawing 1, 2, 3, 4.

5. MECHANISM.—A study of nature and equivalence of mechanisms. Determination of centrodes. Graphical diagrams of the paths, speeds and accelerations of important points of familiar mechanisms. Laying out of cams. Analysis of difficult mechanisms. Determination of velocity ratios. Particular attention is paid to problems relating to motions of gearing, steam-engine mechanisms, parallel motions of indicators, governors, link motions, valve gears, and indicator riggings. *Fall term, full study.* Mr. WOOD.

Required: Math. 2, 4, 6; Mechanical Engineering 1, 2, 4.

7. THERMODYNAMICS.—The fundamental principles underlying the transformation of heat into work, more especially as exemplified in the steam engine, are carefully studied. Considerable attention is paid to the solution of numerous examples, such as will arise in steam, air, or gas engineering. Drill is given in the rapid and accurate use of standard steam tables. *Fall term, full study.* Professor BRECKENRIDGE.

Required: Math. 7, 8, 9; Theoretical and Applied Mechanics 1; Physics 1, 3.

8. MECHANICS OF MACHINERY.—This is a study of the theoretical principles involved in the construction of such machinery as comes under the head of hoisting apparatus, pumping engines, air compressors, fans, blowers, machinery for transmitting power, locomotives, pile drivers. *Winter term, three-fifths study, and spring term, full study.* Professor BRECKENRIDGE.

Required: Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 5, 7, 14, 15.

9. ADVANCED DESIGNING.—This work follows the design of a high-speed steam engine, and comes under two heads

Advanced Design: Under this head the work begins with simple machines and extends to more difficult designs as the student progresses. The design of attachments to existing machines, or the complete design of some machine that can be built in the shops, is often a part of this work. Such designs as hoists, pumps, drills, lathes, shapers, water motors, etc., are undertaken, and the student gains the same information that he would in commercial offices for this kind of work.

Original Design: In this work the student's previous training in designing is combined with his inventive ability, and often valuable and ingenious work is done. The machines are to be designed for accomplishing a certain prescribed work. Often but a single piece is handed the student, and a machine is required which will produce a given number of these pieces per hour.

A large amount of study of existing machines is required. The student is taught to consult the standard works on designing, such as *Unwin*, *Reuleaux*, *Klein*, *Marks*, *Richards*, and to use such books as *Kent*, *Nystrom*, *Haswell*, *Taschenbuch der Hütte*, etc. *Winter and spring terms, full study.* Assistant Professor VANDERVOORT and Professor BRECKENBRIDGE.

Required: Theoretical and Applied Mechanics; 1, 2, 3; Mechanical Engineering 1 to 8, and 14.

10. ESTIMATES, SPECIFICATIONS, AND SUPERINTENDENCE.—Calculations and estimates are made as to the cost of machinery, power plants, boilers, chimneys, systems of piping, engines and their foundations, different methods of power transmission

Also forms of contracts and specifications are studied. *Spring term, full study.* Assistant Professor VANDERVOORT.

Required: Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 1 to 6, 9, 11, 12.

12. ADVANCED MECHANICAL ENGINEERING LABORATORY.—This work is a continuation of the work begun in junior year. Experiments are

made with engines, pumps, motors, injectors, and boilers to determine under what conditions they may be expected to give a maximum efficiency. A limited amount of commercial testing may be undertaken. Tests of plants in the vicinity are made a feature of this work. Carefully prepared reports are always required. Through the kindness of Mr. W. Renshaw, Superintendent of Machinery of the Illinois Central Railroad, opportunities will be afforded to do practical work in locomotive testing, and considerable apparatus has been constructed for this important work. It is also the plan to assign, under this head, certain advanced constructive work in the shops to groups of students, in order to impress upon them the intimate relation existing between the designing room and the shop. *Carpenter's Experimental Engineering. Fall and winter terms, full study.* Professor BRECKENRIDGE, Assistant Professor VAN DERVOORT, and Mr. WOOD.

Required: Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 1 to 7, 14, 15.

13. MECHANICAL ENGINEERING LABORATORY.—This Laboratory course is arranged with special reference to the needs of the students in electrical engineering and other departments. The student is taught to apply the indicator to different engines and to make the usual calculations of horse power and steam consumption as given by the diagrams. Correct forms of reducing motions are explained. How to read indicator diagrams and valve setting are also taught. *Indicator Practice and Steam Engine Economy—F. F. Hemenway. Spring term, half study.* Mr. WOOD.

Required: Mechanical Engineering 1, 2; Math. 7, 8, 9.

14. HIGH SPEED STEAM ENGINE DESIGN.—Under this head the steam engine is carefully studied in all its details. A series of plates is drawn showing for the minimum, average, and maximum horse power the pressure of steam on the piston at all points of the stroke, the pressure at cross head pin, crank pin, crank shaft at all crank angles; taking into account the forces of inertia combined with the steam pressures—counterbalancing crank disc, weight of fly wheel. Each part of a complete engine is designed, and detailed drawings made and traced, so that each member of the class may have a complete set of blue prints. *Klein's High Speed Steam Engine. Fall term, three-fifths study.* Assistant Professor VANDERVOORT.

Required: Theoretical and Applied Mechanics 1, 2; Mechanical Engineering 1 to 7, 16, 17.

15. VALVE GEARS.—Recitations and drawing room work. The application of graphical diagrams as an aid in the study and design of valves for steam distribution in the engine cylinder is carefully brought

out. Determination of the dimensions of steam passages, single valve gears, double valve gears, equalization of steam distribution, application of diagrams to existing types of engines. *Klein's High Speed Steam Engine. Fall term, two-fifths study.* Assistant Professor VANDERVOORT.

Required: Mechanical Engineering 1 to 7, 16, 17; Theoretical and Applied Mechanics 1, 2.

16. STEAM ENGINES.—A study of the details of steam engines. Elementary principles of transformation of heat into work. Laws of expansion of steam. The mechanics of the steam engine. Valves and valve gears. The indicator diagram, condensers, steam jackets, superheaters, and compound engines. *The Steam Engine, Holmes. Winter term, three-fifths study.* Mr. WOOD.

Required: Theoretical and Applied Mechanics 1; Physics 1 and 3.

17. STEAM BOILERS.—Materials used in the construction of boilers. Proportions and strength of riveted joints. Methods of setting boilers for maximum efficiency. Incrustation, explosions, combustion, safety appliances, feed apparatus, boiler trials. *A Treatise on Steam Boilers, Wilson-Flather. Winter term, two-fifths study.* Mr. GOODENOUGH.

Required: Mechanical Engineering 1; Physics 1 and 3; Mathematics 2, 4, 6.

18. GRAPHICAL STATICS OF MECHANISM.—Graphical determination of the forces acting at different points in machines used for hoisting, crushing, punching, and transmitting motion, taking into account the resistances offered to motion by frictional resistances. Effort of sliding, rolling, and journal friction, chain friction, tooth friction, stiffness of ropes and belts. Graphical determination of the efficiency for the forward and reverse motion. *Graphical Statics of Mechanism, Herrmann-Smith. Winter term, two-fifths study.* Mr. GOODENOUGH.

Required: Theoretical and Applied Mechanics 1 and 2.

19. SEMINARY.—Work supplementary to other studies of the senior year. Presentation of papers on assigned subjects. Contributed papers on current topics. Discussion and criticisms on new inventions. *Fall, winter, and spring terms.* Professor BRECKENRIDGE.

20. SHOP PRACTICE FOR SPECIAL STUDENTS.—This course is open to those entering as special students, as defined elsewhere under "Admission." The work will be arranged after consultation. The work done does not count for a credit for graduation in any of the technical courses. *Fall, winter, and spring terms.* Assistant Professor VANDERVOORT.

21. FORGE SHOP PRACTICE.—This course is designed for those

students taking the winter course in Agriculture. The work covers instruction in forging, such as will be of use to the practical farmer. *Winter term.* Mr. Jones.

COURSES FOR GRADUATES

Primary

101. Advanced Machine Design, 1, 2, or 3 credits.
102. Graphics and Kinematics, 1 credit
103. Mill Engineering, 1 credit.
104. Steam Engineering, 1, 2, or 3 credits.
105. Experimental Engineering, 1, 2, or 3 credits.
106. Thermodynamics, 1 credit.
107. Pneumatics, 1 credit.
108. Hydraulic Machinery, 1 credit.
109. Mechanical Technology, 1 credit.
110. Translation of Technical Engineering Work, 1, 2, or 3 credits.

Secondary

111. Any primary offered in the College of Engineering, 1 credit. Primary subjects may be taken as secondary in any course for the Master's Degree in the College of Engineering.

112. Indexing and Classification of Engineering Literature, 1 credit.

MECHANICS, THEORETICAL AND APPLIED

1. Analytical Mechanics.—The mechanics of engineering, rather than that of astronomy and physics, is here considered, with a view to the future needs of the student of engineering. In addition to fixing the fundamental concepts and demonstrating the general principles of equilibrium and motion, application of principles and methods is made to numerous and varied engineering problems in such a way that the student must discriminate in the use of data and in the statement of conditions, and so obtain a working knowledge of the subject. As mathematical processes and forms express most readily and quickly the rules and methods of work, the training in this direction is important. This subject requires a thorough working knowledge of the mathematics preceding it in the course. The methods of the calculus are used whenever preferable.

Outline of the subject: Nature and measure of force; composition and resolution of forces; moments; conditions of equilibrium; resultant of systems of forces; center of gravity; moment of inertia; rectilinear and curvilinear motion, and the relation between such motion and the constraining and accelerating forces; dynamics of a rigid body; momentum and impact; work, energy, and power; mechanical advantage;

friction. *Bowser's Analytical Mechanics. Fall term, full study.* Professor TALBOT.

Required: Math. 2, 4, 6, 7, 8, 9.

2. RESISTANCE OF MATERIALS.—In the treatment of this subject it is the aim to give the student a thorough training in the elementary principles of the mechanics of materials, to follow with such experiments and investigations in the testing laboratory as tend to verify the experimental laws, and to add such problems in ordinary engineering practice as will train the student in the use of his knowledge. Attention is also given to the quality and requirements for structural materials.

Outline of the subject: Elasticity of materials; stresses and strains; experimental laws; working strength for different materials; resistance of pipes and riveted joints; bending and resisting moment; shear and elastic curve of cantilever, simple, restrained, and continuous beams; column formulas; torsion, and shafts; maximum internal stresses in beams; fatigue of metals; working strength for repeated stresses; resilience; reliability of the common theory of flexure, as shown by actual experiment; design and strength of rolled and built beams and columns; specifications for materials and methods of testing. *Merriman's Mechanics of Materials. Winter term, full study.* Professor TALBOT.

Required: Math. 2, 4, 6, 7, 8, 9; Theoretical and Applied Mechanics 1.

3. HYDRAULICS.—In hydraulics the instruction is by text-book and laboratory work. The laws of the pressure and flow of water and its utilization as motive power are considered. Experimental work in the hydraulic laboratory gives training in the observation and measurement of pressure, velocity, and flow, and in the determination of experimental coefficients.

The subject covers the following: Weight and pressure of water; head; center of pressure; velocity and discharge through orifices, weirs, tubes, nozzles, pipes, conduits, canals, and rivers; measurement of pressure, velocity, and discharge; meters and measurements; motors, turbines, and water wheels; water power and transmission of power. *Merriman's Hydraulics. Spring term, full study.* Professor TALBOT.

Required: Math. 2, 4, 6, 7, 8, 9; Theoretical and Applied Mechanics 1, 2.

4. APPLIED MECHANICS.—To be taken instead of Analytical Mechanics. The course of study and topics studied will be nearly identical. *Peck's Elementary Mechanics. Fall term, full study.* Assistant Professor MCLANE.

Required: Mathematics 2, 4, 6.

5. Strength of Materials.—To be taken instead of Resistance of Materials. The course of study will be nearly the same, though somewhat simplified. *Merriman's Mechanics of Materials. Winter term, full study.* Assistant Professor McLane.

Required: Mathematics 2, 4, 6; Theoretical and Applied Mechanics 4.

COURSES FOR GRADUATES

101. Analytical Mechanics.
102. Resistance of Materials.
103. Hydraulics and Hydraulic Engineering.
104. Laboratory of Applied Mechanics.

METEOROLOGY

1. Meteorology.—The study of those atmospheric movements which bring changes of weather and the relations of these movements to heat, cold, electrical conditions, wind, cloud, barometric pressure, etc., constitutes the work of the first half of the fall term. Abercrombie's Weather is used as an introductory text-book; but most of the instruction is given by lectures, and the study of charts. Attempts are made by the student to forecast weather changes. *Fall term, two-fifths study.* Professor Rolfe.

Required: Chemistry 3b; Physics 1 or 2.

MILITARY SCIENCE

1. Drill Regulations.—For all male students. First term: school of soldier; bayonet exercise; second term: school of company, close and extended order. *Fall and winter terms, one-fourth study.* Professor Brush.

2. Practical Instruction in School of Soldier.—Company and battalion in close and extended order; school of the cannoneer and of the battery dismounted; target practice. Freshmen and sophomore years; *six terms, counts one and one-half credits.* Professor Brush.

3. Recitations and Practice for Officers and Non-Commissioned Officers.—*Sophomore year:* School of the battalion, close and extended order; ceremonies; review and inspection; military signaling; guard, outpost, and picket duty. *Junior year:* military administration; reports and returns; theory of firearms and target practice; organization of armies; field fortifications; art of war. *Seven terms, recitations one to two hours a week; drill two hours a week.* Professor Brush. This course is obligatory upon officers and non-commissioned officers, and open to others.

MINERALOGY

1. Elements of Mineralogy.—The first term's work is intended to be a general introduction to the subject. Instruction includes lectures and laboratory practice. In the lectures, which occur on specified days (2 or 3) each week, such subjects as follow are discussed: genesis of minerals; conditions favoring their deposition; origin of the massive and crystalline forms; relationships of minerals and their classification; the physical properties of minerals, as color, luster, hardness, gravity, streak, etc., with the conditions which may cause these properties to vary; elements of crystallography, etc.

In the laboratory the student is first made acquainted with the simplest trustworthy methods for proving the presence or absence of the acids and bases. He is then required to determine a large number of species by their physical and chemical properties only. *Fall term, full study.* Professor Rolfe and Mr. Mosier.

Required: Chemistry 1.

2. Advanced Mineralogy.—Crystallographic Mineralogy. During the second term a careful study of the forms of crystals is made, including the measurement of angles and determination of complex forms. The student is also required to identify many species of minerals by their crystalline forms, and to verify his conclusions by the methods in use during the preceding term.

Optical Mineralogy. The work of the third term will be devoted to the microscopic determination of rock forming minerals; to methods for separating the mineral constituents of fine-grained rocks, etc. *Winter and spring terms, full study.* Professor Rolfe and Mr. Mosier.

Required: Mineralogy 1.

MUNICIPAL AND SANITARY ENGINEERING

1. Road Engineering.—Instruction is given by means of text-books and lectures. The value and importance of road improvement in country highways and the best means of securing it are considered, together with the principles and details of construction of earth, gravel, and macadam roads. In city streets, the methods of construction, cost, durability, and desirability of the various kinds of pavement, and the question of grades, cross-sections, methods of assessment of cost, and methods of maintenance and cleaning are treated. *Lectures and reading. Winter term, with Civil Engineering 4, makes a full study.* Assistant Professor Pence.

Required: Math. 4; General Engineering Drawing 1, 2; Civil Engineering 1, 2, 3, 4.

2. Water Supply Engineering.—This subject is intended to cover the principal features of the construction of water works, including the tests and standards of purity of potable water; the choice of source of supply; the designing of the distribution system, pumps and pumping machinery, reservoirs, and stand-pipes. *Lectures; Fanning's Water Supply Engineering. Fall term, full study.* Professor Talbot.

Required: Theoretical and Applied Mechanics 1, 3; Chemistry 1; Mechanical Engineering 16.

3. Sewerage.—The design and methods of construction of sewerage systems of cities, including the following: Sanitary necessity of sewerage: water carriage systems, both separate and combined; surveys and general plans; hydraulics of sewers; relation of rainfall to storm water flow, and determination of size and capacity of sewers; house sewage and its removal; form, size, design, and construction of sewers and sewer appurtenances; modern methods of sewage disposal; estimates and specifications. *Lectures; Staley and Pierson's Separate System of Sewerage. Winter term, full study.* Professor Talbot.

Required: Theoretical and Applied Mechanics 1, 3; Chemistry 1.

5a. Bacteriology.—For students in course in Municipal Engineering. This course includes the identification and classification of bacteria, and of allied organisms, their relations to health and to disease, the methods of separation and cultivation, and the methods of air and water analysis. The laboratory is furnished with sterilizers, culture ovens, microscopes, etc., and students have abundant opportunity to do practical work. *Winter term, two-fifths study.* Professor Burrill.

6. Water Purification, Sewage Disposal, and General Sanitation.—This work will include the consideration of impurities in water supplies and the study of the methods and processes of their removal; the modern methods of sewage disposal by filtration, chemical precipitation, irrigation, etc., with a study of representative purification plants; garbage collection and disposal; sanitary restrictions and regulations and general sanitation. Lectures and seminary work. *Spring term, full study* Professor Talbot.

Required: Municipal and Sanitary Engineering 1, 2, 5a.

COURSES FOR CRADUATES

Water Supply Engineering

101. Tanks, Stand Pipes, and Reservoirs.

102. Sources and Requirements of Water Supply for a City and Removal of Impurities.

103. Water Works Management and Economics.
104. Pumps and Pumping.
105. General Water Works Construction.
106. Biological and Chemical Examination of Potable Water.
107. Description of Water Supply Systems.

Sewerage

111. Sewage Purification.
112. Sewage Disposal Works.
113. General Sewerage Design and Construction.
114. City Sanitation.
115. Description of Sewerage Systems.

Road Engineering

118. Economic Aspect of Good Roads and Pavements.
119. Construction of Roads and Pavements.

Miscellaneous Subjects

121. Critical Description of Engineering Construction.

122. Translation of Technical Engineering Work from French or German.

123. Any Primary in Civil Engineering.

124. Any Primary in Theoretical and Applied Mechanics.

125. Any Primary in Mathematics, Mechanical Engineering, or Electrical Engineering—Secondary.

126. Indexing of Municipal and Sanitary Engineering Literature in Engineering Periodicals.

MUSIC

Only Course 1 may be taken for credit for the regular degree by students in the College of Literature and Arts, and then only if they are at the same time enrolled in the department of music.

1. History of Music.—Lectures on the development of music from its beginning among the Greeks to the present day, including the rise of dramatic music, the origin and progress of the oratorio, the evolution and development of instrumental forms, and studies in the lives of the composers. Assigned collateral readings. *Fall, winter, and spring terms, three-fifths study.* Professor Jones.

2. Theory of Music.—*First:* A course in harmony, two hours a week, in class, through four terms. *Emery's Harmony* with additional exercises. *Weitzman's Theory of Music.*

Second: A course in counterpoint, two hours a week in class through two terms. *Richter's Counterpoint.*

Third: A course in fugue, two hours a week in class through two terms. *Richter's Fugue.*

Fourth: A course in musical analysis which may be taken at the same time with the studies in counterpoint and fugue. The second, third, and fourth parts of this course are open only to advanced students showing special aptitude. Professor JONES.

3. COURSE FOR THE PIANO.—(a) *Preparatory.* This course is equivalent to three years' work. It includes formation and position of fingers, hands, wrists, and arms, properties of touch, principles of technique, thorough drill in scale and arpeggio playing, and exercises in accent, rhythm, and expression. Music used: Herz, Scales and Exercises; Loeschhorn, Op. 65, 66; Lemoine, Op. 37; Heller, Op. 45; Bertini, Op. 29, 32; Czerny, Op. 299, Bks. 1, 2; Bach's Little Preludes; also sonatinas and easier sonatas and compositions by Clementi, Kuhlau, Haydn, Mozart, Mendelssohn, Merkel, Dussek, Diabelli, Grieg, Bargiel, and others.

(b) *Collegiate.* First year. Studies in development of technique: Czerny, Op. 299, Bks. 3, 4; Czerny, Octave Studies; Cramer, Études; Jensen, Études; Bach, Two-Voice Inventions and French Suites; Sonatas of Haydn and Mozart; easier Sonatas of Beethoven; Songs Without Words, Mendelssohn; Compositions (smaller works) of Beethoven, Chopin, Schubert, Raff, Grieg, Chaminade, Moszkowski, and others.

Second Year. Daily technique; Czerny, Op. 740; Bach, Three-Voice Inventions and English Suites; Sonatas and other Compositions of Scarlatti, Beethoven, Schubert, Schumann, Mendelssohn, Weber, Raff, Rubinstein, St. Saens, Godard, MacDowell, and others.

Third Year. Selections: Clementi, Gradus ad Parnassum; Moscheles, Op. 70; Kullak, Seven-Octave Studies, Bk. 2; Bach, Well-Tempered Clavichord; Sonatas and Concertos by Mendelssohn, Weber, Beethoven, Hummel, Brahms, etc.; selections from works of Bach, Chopin, Schubert, Schumann, Brassin, Rubinstein, Liszt, Moszkowski, Scharwenka, and other modern composers.

Fourth Year. Selections: Octave Studies; Clementi, Gradus, continued; Bach, Well-Tempered Clavichord, continued; Chopin, Études; Henselt, Études; Rubinstein, Études; Sonatas by Beethoven, and Concertos and other Compositions by the great masters, classic and romantic, both of the older and the more modern schools. Professor JONES.

4. COURSE FOR THE ORGAN.—A similar preparatory and collegiate course for the organ will be offered for any one caring to make this the principal instrument. Professor JONES.

5. Course for the Voice. — (a) *Preparatory*. Voice-placing studies; breathing exercises; elementary vocalises; simple songs.

(b) *Collegiate*. First year. Voice production. *Coucone's 50 Lessons*. Songs.

Second year. Voice production. *Coucone's 25 studies. Coucone's 15 studies*. Songs.

Third year. Voice production. *Marchesi Studies*. German and English Song.

Fourth year. Voice production. *Panofka's Studies*, or equivalent. Italian, German, and English Song. Opera and oratorio selections. Miss Rowley.

6. Course for the Violin.—(a) *Preparatory*. Formation of correct position and style of bowing. Training of ear and fingers. Mastery of the different positions in De Beriot's Method. Scales and arpeggios through three octaves. *Schradieck's "Scales Studies"* and "*Technical Studies," Maza's "Special Etudes," Dont's "Twenty-four Etudes preparatory to Kreutzer and Rode*." Selections from Pleyel, Daucla, David, Bohm, Papini Tartini, Corelli, and others, both classic and modern. The preparatory course is equivalent to three years' work.

(b) *Collegiate*. First year. Kreutzer's 40 Études. Concertos by Viotti, Rode, and Kreutzer. Beethoven's Romances, Op. 40 and 50.

Second year. Fiorillo's 36 Études. Rode's 24 Caprices. Concertos by Spohr, DeBeriot, or David. Beethoven's Sonatas. Ensemble playing. Lighter compositions of best modern composers.

Third year. Concertos by Mendelssohn, Beethoven, Hans Sitt, or Gade. Sonatas by Schumann, Grieg, Brahms, and others. Pieces by Raff, Dvorak, and other modern composers. Ensemble playing continued.

Fourth year. Concertos by Brahms, Tschaikowsky, Joachim, Wieniawski, Ernst or Paganini. Paganini's "Caprices." Bach's Solo Sonatas. Special study of higher forms of technique. Concert works of classic and modern composers. Mr. Pierce.

PALEONTOLOGY

1. Advanced Paleontology.—The work outlined under Geology 1d. can do little more than introduce the general subject. To those who desire a better acquantance with paleontology a course of two terms is offered.

This course will include: (a) Discussion of the biological relations of fossil forms along the lines indicated in Williams's Geological Biology; (b) a discussion of the principles of classification as applied to fossils, together with the characteristics which distinguish the larger groups,

using Nicholson and Zittel as guides; (c) a study of the distribution and variations of the genera and species of one or more of the more important groups as illustrated by the collections of the University, using the various state reports and Miller's Handbook as aids. *Winter and spring terms, full study.* Professor ROLFE and Mr. MOSIER. A major in Botany and Zoölogy would aid the student greatly in this work, but neither is absolutely required.

Required: Geology 1.

PEDAGOGY

1. THE PSYCHOLOGY OF THE TEACHING PROCESS.—(a) The nature and organic elements of the process deduced and exemplified in various subjects. (b) The principles of school organization and management derived from the foregoing, with a special study of the recitation in which the teaching process realizes itself. (c) The field of pedagogical inquiry mapped as a basis and guide to further study. *Fall term, full study.* Professor TOMPKINS.

Required: Two years' University work.

2. THE AIM OR MOTIVE, IN TEACHING.—(a) The true, or universal aim, as determined by the nature of life. (b) The various aims as consciously or unconsciously held at present by different countries and classes of people. Such diversity accounted for and unified. (c) The aim as shown in variation through historical development—the history of educational ideals. *Winter term, full study.* Assistant Professor MCGILVREY.

Required: Two years' University work.

3. THE UNIVERSAL FORM OF METHOD IN EDUCATION, as determined by the nature of life. (a) In its subjective aspect. (b) In its objective aspect. (c) The three forms of the relation of "a" and "b," giving rise to the logic, ethics, and esthetics of education—the fundamental educational categories. *Spring term, full study.* Professor TOMPKINS.

Required: Pedagogy 1 and 2.

4. THE UNIVERSAL LAW AND PROBLEM OF THINKING.—Special movements of the mind in learning discriminated. (1) How to think objects into organic unity. (2) How to think objects into class unity. *Fall term, full study.* Professor TOMPKINS.

Required: Pedagogy 3.

5. THE LOGICAL AND THE PSYCHOLOGICAL FACTOR IN EDUCATIONAL METHOD; that is, the foregoing process modified by the psychological factor. The sketching of lessons in recognition of the two factors. *Winter term, full study.* Assistant Professor MCGILVREY.

Required: Pedagogy 4.

6. Special Methods in Subjects, as determined by the logic of the subject and by the learning mind. These exemplify in concrete operation all the foregoing laws. *Spring term, full study.* Assistant Professor McGilvrey.

Required: Pedagogy 5.

COURSES FOR GRADUATES

101. The Nature and Purpose of Education as revealed in the nature and purpose of human life, as interpreted in Literature and Philosophy.

102. The History of Educational Ideals and Theories, as tested by the standard developed in the foregoing.

103. Universal Method in Education as determined by the three organic phases of life—Logical, Ethical, Esthetical.

104. The Course of Study as determined by the Logical and Psychological Factors in Education.

105. The Philosophy of School Organization, Management, and Supervision as determined by the purpose and process of education.

106. School Systems past and present, as determined by their historical setting and by the educational theories of the times.

PHILOSOPHY

1. Outlines of Philosophy.—This course is offered for the benefit of students who can give only a single term to the study of philosophy. It is designed primarily to meet the wants of science students who desire some knowledge of the subject. The most important problems in philosophy and methaphysics are presented. Lectures and prescribed reading. *Fall term, full study.* Assistant Professor Daniels.

2. Ancient and Mediæval Philosophy.—A rapid survey is taken of the development of speculative thought, beginning with the early Greek philosophers and continuing through the mediæval period. *Fall term, three-fifths study.* Assistant Professor Daniels.

3. Modern Philosophy.—This course considers the formation and development of the problems and conceptions in philosophy from Descartes to the present time. Selections from the philosophical masterpieces of this period are carefully studied. Special emphasis is laid upon the philosophy of Kant. *Winter and spring terms, three-fifths study.* Assistant Professor Daniels.

4. Metaphysics.—This course consists of a somewhat critical and thorough study of subjects of special prominence in philosophy; *e. g.*, realism, idealism, and the theory of knowledge. No text-book is used.

Topics are assigned and papers, prepared by the students, are read and discussed in the class. To promote acquaintance with current philosophical thought various articles on different aspects or problems of modern philosophy are read and criticised. *Winter term, two-fifths study.* Assistant Professor DANIELS.

5. ADVANCED PHILOSOPHY.—The work consists in a critical study of *Lotze's Microcosmus*, together with supplementary readings and discussions upon suggested topics. The course is designed for somewhat advanced students, and is open to those who have received at least two credits in philosophy. *Fall and winter terms, full study.* Assistant Professor DANIELS.

Required: Philosophy 2, 3, 4.

6. PRACTICAL ETHICS.—In this course those questions which bear the closest relation to life and conduct are raised and discussed. The duties of the individual, the family, and the state are among the subjects considered. Special subjects in social ethics may be taken up, including the duties of society to the unfortunate and delinquent classes. *Spring term, two-fifths study.* Assistant Professor DANIELS.

7. HISTORY AND CRITICISM OF ETHICAL THEORIES.—A careful and historical examination of the various types of ethical theory, including rational, hedonistic, eudemonistic, esthetic, and evolutional ethics. It is designed to make the student as familiar as the time allows with the writings of representative men of the various schools. *Spring term, three fifths study.* Assistant Professor DANIELS.

8. LOGIC.—This course aims to give a knowledge of the principles of deductive and inductive reasoning. Special attention is given to fallacies and to the problems, grounds, and principles of induction. The study is designed not only to direct the student in practical reasoning and correct thinking, but also to familiarize him with the principles and methods of scientific investigation. *Spring term, full study.* Assistant Professor DANIELS.

9. CONTEMPORARY PHILOSOPHICAL THOUGHT.—The aim of this course is to present the philosophical views of several thinkers of the present time. Special attention is given to the philosophy of Herbert Spencer. Lectures and prescribed reading. *Fall term, full study.* Assistant Professor DANIELS.

Required: Philosophy 1, 2, 3. [Not given in 1897-98.]

10. ESTHETICS.—A brief history and a critical study of the various theories of the beautiful. Lectures and assigned readings. *Fall term, three-fifths study.* Assistant Professor DANIELS. [Open to juniors and seniors.]

COURSE FOR GRADUATES

101. THE PHILOSOPHY OF KANT.

PHYSICAL TRAINING

FOR MEN

1. GYMNASIUM AND FIELD PRACTICE required in winter term twice a week, as part of military science. *One-fourth credit counted with the latter subject.* Assistant Professor EVERETT.

2. LECTURES AND PRACTICAL DEMONSTRATIONS.—This course is offered to students who wish to gain a better comprehension of the value of physical exercise, its use and abuse, how to train properly for athletic contests, and thus to avoid the ill-effects which too often follow a course of athletic training. It is hoped that by thus connecting the theoretical and practical work, better results will be obtained in the department.

During the fall term the subject of applied anatomy receives attention—the muscles and their action, with the various methods of developing their power; first aid to the injured; how to prevent and correct physical deformities; specific exercises and their efforts on the organs of the body, etc.

In a similar manner, during the winter term, special physiological instruction is given upon such topics as the following: The effects of exercise and training on the action of the heart, lungs, and other vital organs; diseases from overwork, their prevention and eure; personal hygiene, sleep, diet, exercise, bathing, clothing, colds, tobacco, and alcohol. *Once a week. Fall and winter terms, one-fifth study.* Assistant Professor EVERETT.

FOR WOMEN

3. GYMNASIUM AND FIELD PRACTICE, three hours a week for two years. This course taken with Physical Training 4 counts for two credits. Miss MORRISON.

FOR MEN AND WOMEN

4. HYGIENE.—This course is prescribed for young women who take physical training for credit. It is designed to impart a knowledge of the conditions of bodily health and activity. Among the more important subjects treated may be named the theory of bodily exercise, ventilation and heating, the composition and relative nutrient value of foods, and the causes and methods of communication of contagious diseases. The course deals with those practical hygienic problems of everyday life that are wholly or in large part under the control of each individual. *Fall and winter terms, one-fifth study.* Associate Professor SUMMERS.

Required: University examination in entrance physiology or its equivalent.

PHYSICS

1. General Physics.—A course of experimental lectures. The subjects treated are mechanics and heat, fall term; electricity and magnetism, winter term; sound and light, spring term. The course is required of students in the College of Engineering, and students of physics, chemistry, and mathematics in the College of Science. The course is to be taken in connection with the laboratory course, Physics 3. Lectures three times a week with a quiz hour. *Fall, winter, and spring terms, three-fifths study.* Professor Carman.

Required: Math. 3 or 4.

2. See Physics 1 and 3 for fall term.

3. Introduction to Physical Measurements.—A laboratory course running parallel with Physics 1, and required of the same students. The course consists of a list of quantitative experiments, illustrative of the lectures in general physics, and introductory to more advanced laboratory work. One period of three hours each week. *Fall, winter, and spring terms, two-fifths study.* Mr. Quick.

Required: Math. 3 or 4.

4. Electrical and Magnetic Measurements.—An advanced lecture and laboratory course in the theory and use of electrical and magnetic measuring instruments. Required of students in electrical engineering, and open to others. *Fall term, half study; winter and spring terms, full study.* This course may be taken as *one and one-half studies in the winter term, and a half study in the spring term.* Assistant Professor Sager.

Required: Physics 1 and 3; Math. 7, 8, 9.

5. Advanced Physical Measurements.—A laboratory course supplemented by recitations and lectures. This course presupposes Physics 1 and 3 or equivalents. It gives practice in exact physical measurements, and an experimental acquaintance with the more accurate methods of determining various physical constants. Three times weekly through the year. *Fall, winter, and spring terms, three-fifths study. This course can also be taken as a full study.* Professor Carman and Assistant Professor Sager.

Required: Physics 1 and 3. Math. 7, 8, 9 desired.

6. Introduction to Theoretical Physics.—A course of lectures and recitations, taking up dynamics, fall term; theory of electricity and magnetism, or optics, winter term; and thermodynamics or optics, spring term. Each term is made independent as far as possible. Three times a week. *Fall, winter, and spring terms, two-fifths study.* Professor Carman and Assistant Professor Sager.

Required: Physics 1 and 3; Math. 7, 8, 9.

7. Investigation of Special Problems —An advanced laboratory course in continuation of Physics 5. The student is given one or more special subjects of investigation to be conducted throughout the year under the direction of the professors of the department, and special facilities will be provided for the work, either by buying or making special apparatus in the machine shop of the department. *Fall, winter, and spring terms, full study.* Professor Carman and Assistant Professor Sager.

Required: Physics 5 or equivalent.

8. Mathematical Physics.—A course of lectures and recitations. The subjects treated are changed each year, and are arranged to cover the general subject in two consecutive years, each year being complete in itself. The subjects for 1896–97 are theory of electrical and magnetic potential, and Maxwell's Theory of Electricity and Optics, using in the latter course Boltzmann's and Poincaré's lectures as references. Three times a week through the year. *Fall, winter, and spring terms, three-fifths study.* Professor Carman.

Required: Physics 1, 3 and 4, 5 or 6; Math. 7, 8, 9, (16 desired).

GRADUATE COURSES

101. Advanced Physical Measurements and Investigation. One to three credits.

102. Mathematical Physics. One to three credits.

PHYSIOLOGY

(Human)

1. Major Course.—Taking as a basis the knowledge of the structure and physiology of mammals obtained in Zoölogy 1 or 3, or Physiology 4, there is made a systematic study of the differences, so far as they are of physiological import, between the anatomy of man and of the type mammal there studied; a more detailed study of the facts and methods of mammalian histology; and, finally, with as much fullness as the time will permit, a study of the special physiology of man. In the laboratory work the topics are selected to illustrate so far as possible the different methods of obtaining physiological data. *Winter and spring terms, full study.* Associate Professor Summers.

2. Advanced Physiology.—There are here included the following lines of laboratory work, any one or more of which may be pursued independently of the others. (a) The physiology of foods, digestion, and exertion; (b) the blood, circulation, and respiration; (c) the excretions, especially urinalysis; (d) general physiology of nerve and muscle; (e) advanced vertebrate, especially human, histology. The first and third of these illustrate the application of chemical principles and methods

to physiological research; the second and fourth, of physical methods, and practice in the use of instruments of precision; and the fifth, of the microscope, and histological methods. *Fall, winter, and spring terms, one to three credits.* Associate Professor SUMMERS.

Required: Physiology 1, and for (b) and (d), Physics 1 and 3.

3. INVESTIGATION AND THESIS.—An opportunity for original investigation, upon which may be founded the graduating thesis, is offered to students in their senior year. While the instructor has a general supervision of this work, it is expected that the student will at all times take the initiative, seeking only such information and advice as he would ask of any co-worker in his department of science. *Winter and spring terms, full study.* Associate Professor SUMMERS.

Required: Physiology 1, 2.

4. MINOR COURSE.—This course is planned for literary students and for students of natural science specializing in other lines. While some attention is paid to all the important processes of the body, especial emphasis is laid upon those facts that serve as a basis for practical hygiene. *Fall term, full study.* Associate Professor SUMMERS.

Required: Chemistry 1.

5. NERVOUS SYSTEM.—Daily lectures, with illustrative laboratory work, on the physiological anatomy and functions of the nervous system of man. The course includes a discussion of the methods of investigating the physiology of the human central nervous system, many of which cannot be used in university instruction; and of the principles of the application of the facts learned to the diagnosis of diseases of the nervous system. *Spring term, full study.* Associate Professor SUMMERS.

Required: Physiology 1 or 4.

6. HYGIENE.—A course of lectures, demonstrations, and recitations on the laws of health. Especial attention is paid to those conditions which are under the control of the individual, but considerable time is devoted also to those questions of public health, an acquaintance with which is necessary for every citizen who desires to take an intelligent part in controlling public sanitary policy. The main subjects discussed are foods and diet, water supply, bathing, clothing, shelter, soil, ventilation, heating, lighting, sewage, plumbing, exercise, contagious diseases, disinfection, and the special hygiene of the nervous system. *Winter term, full study.* Associate Professor SUMMERS.

PSYCHOLOGY

1. General Psychology.—In this course are considered the more general problems of the mental life of the normal individual, especially those that have a living interest for the student, and find illustration in his every day life. Among the topics discussed the following are the principal: Relation of mental activity to bodily changes, sensation, habits, attention, memory, imagination, association of ideas, reasoning, instinct, emotion, will, localization of cerebral functions, time relations of mental phenomena. The course is amply illustrated by the use of apparatus, charts, prepared tissue, and photographs. Endeavor is made to give the class the more important results of recent researches, and the course is made to comprise the results of both the introspection and laboratory methods. *Fall term, full study.* Assistant Professor Krohn.

2. Laboratory Psychology.—This course is made up of lectures and laboratory work, with assigned reading. The class performs a series of about one hundred experiments to illustrate the time relations of mental processes, the influence of mind and body upon each other, and the psychic factors in sensation. The current literature in this field is discussed in the class, and made the basis of reports and reviews on the part of the students. *Winter and spring terms, three-fifths study.* Assistant Professor Krohn.

3. Comparative Psychology.—This course embraces the study of the lower mental activities as manifested in the life of various animals. The object of the course is to trace the development of mind along the animal scale, ranging from the lower forms to the more complex mental phenomena in the conscious life of man. *Romanes and Lloyd-Morgan. Spring term, two-fifths study.* Assistant Professor Krohn.

Required: Psychology 1, 2, or 9.

4. Educational Psychology.—In this course are discussed the growth and development of the mind, especially with reference to the first years of childhood. The attempt is made to devise methods by means of which the contents of a child's mind may be determined at any period of its development. Thus the various methods of testing and training the memory, attention, and other mental powers, will be submitted and employed in actual observations, upon which note will be made for discussion in class. The order in which the various mental capacities unfold will also form an important theme for study. The course is thoroughly practical in its nature. *Krohn's Practical Lessons in Psychology. Fall term, two-fifths study.* Assistant Professor Krohn.

5. Psychology of Crime.—This course consists of a special study

of the criminal as a morbid individual in comparison with the normal person. *Spring term, two-fifths study.* Assistant Professor KROHN.

Required: Psychology 1, 2, or 9.

6. PSYCHOLOGY OF ABNORMAL TYPES.—In this course the following, among other subjects, will be studied: The chief forms of mental diseases or types of insanity, the diseases of memory, the diseases of language, the diseases of will, double personality, peculiar dreams, hallucinations, illusions and delusions. The life of the blind, deaf, and imbecile will be inquired into with a view to determine the best methods of education for these classes. *Winter term, three-fifths study.* Assistant Professor KROHN.

Required: Psychology 1, 2, or 9.

7. ADVANCED EXPERIMENTAL PSYCHOLOGY.—Work in this course is arranged for each student individually, and may involve a systematic review of the laboratory methods of some master work in experimental psychology, or it may involve original research. The aim is to give treatment to certain social problems, necessitating original research, and the verification of important features of earlier experiments. *Fall, winter, and spring terms, full study.* Assistant Professor KROHN.

Required: Psychology 2.

8. PSYCHOLOGICAL SEMINARY.—The subject and hour to be determined after consultation with those who apply. The work in this course is chiefly in the line of discussion of psychological topics and special investigation, as well as reports on the recent psychological literature. All students pursuing major work in this department are required to take an active part in the seminary during their second year. *Once a week; two credits.* Assistant Professor KROHN.

9. ELEMENTARY PSYCHOLOGY.—A course of lectures for the purpose of acquainting the student with the elements of Psychology, with respect to its principal methods and main conclusions. *Winter term, full study.* Assistant Professor KROHN.

COURSE FOR GRADUATES

101. SPECIAL INVESTIGATIONS.—A research course consisting in the investigation of special problems, the nature and scope of these investigations to be determined after consultation.

PUBLIC LAW AND ADMINISTRATION

1. POLITICAL INSTITUTIONS.—Comparative study of modern political systems, their historical development and practical operation.

The fall term is devoted to the leading features of national and state government of the United States; in the winter term, the governments of the leading European states are studied; in the spring term, topics in political methods are considered, such as the primary, the nominating convention, Australian ballot, proportional representation, etc. Lectures, assigned readings, reports, and discussions. *Fall, winter, and spring terms, three-fifths study.* Assistant Professor Tooke.

2. Jurisprudence.—Elementary course in the origin, development, and classification of law, followed by an introduction to the fundamental principles of the English Common Law. *Fall, winter, and spring terms, two-fifths study.* Assistant Professor Tooke.

3. Roman Law.—Early history. The classical jurisprudence. Legislation of Justinian. Influence of the Roman system. Readings and lectures. *Winter and spring terms, two-fifths study.* Assistant Professor Tooke.

Required: A reading knowledge of Latin.

4. International Law.—Sources and historical development. Essential powers of states, their rights and their obligations. Laws and usage in time of war. History of American diplomacy. *Winter and spring terms, three-fifths study.* Assistant Professor Tooke.

Required: Public Law and Administration 1.

5. Comparative Administrative Law.—General principles of administrative law of the United States (national and commonweath), England, France, and Germany. The appointment, tenure, and duties of officers. Historical and comparative study of local government. *Fall, winter, and spring terms, two-fifths study.* Assistant Professor Tooke.

Required: Public Law and Administration 1 and 2. (Not given in 1897-8).

6. Comparative Constitutional Law.—A comparison of the leading states of Europe, and of North and South America, special attention being paid to the constitutional law of the United States, England, Germany, and France. The work of the fall term is American constitutional law, text-book and assigned cases; that of the winter term is a comparative study from original sources of constitutions of the leading European states. In the spring term, the theory and practice of the South American constitutions are considered. *Fall, winter, and spring terms, three-fifths study.* Assistant Professor Tooke.

Required: Public Law and Administration 1, 2.

7. Law of Municipal Corporations.—History and legal status of the American municipality. To supplement course 5. *Fall and winter terms, two-fifths study.* Assistant Professor Tooke.

8. LAW OF TAXATION.—Nature of the taxing power. Constitutional limitations. Procedure of tax administration. Remedies open to tax payers. *Spring term, two-fifths study.* Assistant Professor TOOKE. [Not given in 1897-8.]

9. SEMINARY OF CONSTITUTIONAL LAW.—Open to graduates and to seniors taking course 6. The general subject for 1897-8 will be a study of the principles established by the leading decisions of the Supreme Court of the United States. *Fall, winter, and spring terms, two-fifths study.* Assistant Professor TOOKE.

RHETORIC

1. RHETORIC AND THEMES.—Required for students in the College of Literature and Arts. *Three hours a week; fall, winter, and spring terms.* The course counts for two credits. Assistant Professor T. A. CLARK and Miss BUTTERFIELD.

2. RHETORIC AND THEMES.—Required for students in the Colleges of Agriculture, Science, and Engineering. *Three hours a week; fall, winter, and spring terms.* The course counts for two credits. Assistant Professor T. A. CLARK and Miss BUTTERFIELD.

3. DAILY THEMES.—Higher English Composition. *Two hours a week; fall, winter, and spring terms, full study.* Assistant Professor T. A. CLARK.

Required: Rhetoric 1 or 2.

4. ARGUMENT.—This course will be devoted to lectures and text-book work on the principles of argumentative discourse. Weekly practice in the writing of arguments will be required. *Winter term, full study.* Assistant Professor T. A. CLARK.

Required: Rhetoric 1 or 2.

SOCIOLOGY

[See under Anthropology, Anthropometry, and Economics.]

SPANISH

1. GRAMMAR AND READING.—Edgren's Spanish Grammar; Knapp's Spanish Readings; Cervantes' Don Quijote; outlines of Spanish literature. *Fall, winter, and spring terms, full study.* Assistant Professor FAIRFIELD.

THEORETICAL AND APPLIED MECHANICS

[See Mechanics, p. 175.]

VETERINARY SCIENCE

1. ANATOMY AND PHYSIOLOGY.—The anatomy and physiology of the domestic animals constitute the subjects of instruction for one term. The instruction is given by lectures aided by demonstrations with use of skeletons, aud of other apparatus as follows: Dr. Auzoux's complete model of the horse, which is in ninety-seven pieces and exhibits three thousand details of structure; papier-maché model of the horse's foot; the teeth of the horse at different ages; and dissections of animals. This work is supplemented with the study of text-books. *Strangeways' Veterinary Anatomy and Mills's Animal Physiology. Fall term, full study.* Professor McINTOSH.

2. PRINCIPLES AND PRACTICE OF VETERINARY MEDICINE.—This subject is taught by lectures and text-books on the diseases of domestic animals, and is illustrated with specimens of morbid anatomy and by observations and practice at the clinics. The latter are held at the veterinary infirmary once a week. The students assist in the operations, and thus obtain a practical knowledge of the subject. Dissections and postmortems are made as cases present themselves. Text-books: *Diseases of Horses and Cattle, by D. McIntosh, and Williams's Practice of Veterinary Medicine and Surgery. Winter and spring terms, full study.* Professor McINTOSH.

3. VETERINARY MATERIA MEDICA.—This subject, which treats of the agents for the cure of disease or injury, or for the preservation of health among domestic animals, is taught by lectures and text-books, illustrated by specimens of the drugs used in veterinary practice. The compounding of medicines also receives attention. *Fall, winter, and spring terms, full study.* Professor McINTOSH.

ZOÖLOGY

1. GENERAL ZOÖLOGY, MAJOR COURSE.—The work here described forms a continuous course, beginning in the winter term of the freshman year and ending with the fall term of the sophomore year. It is the immediate object of this course to lay the foundation for a working knowledge of zoölogy, and its secondary object to draw from zoölogical science its distinctive discipline as an element in a liberal education. It is planned with a view to giving students a wide acquaintance with the methods of zoölogical research in field, laboratory, and library, and a general acquaintance with zoölogical theory, and the leading facts of observation and experiment upon which such theory rests. It is devoted especially to a series of laboratory studies of animal types, and to lectures on the morphology, physiology, and relations to nature of this se-

lected series. It is divided into three sub-divisons consisting of one term each. The first term's work may be taken separately as a minor by students not in the natural science group.

a. The laboratory work of the first term includes dissections of the earthworm, serial sections of this form and of Hydra, and numerous studies and preparations of the Protozoa. Lectures on the structure: physiology, and classification of the Protozoa, their relations to plants and to the organization, embryological development, and history of the higher animals are made to elucidate and illustrate the general theory of zoölogy, which is here presented in outline to be filled in and completed as the work proceeds. The general zoölogy of the remaining lower invertebrate forms, including Vermes, finishes the work of the term.

b. The second term is devoted to the morphology, physiology, and general classification of the remaining invertebrates, with principal attention to the Arthropoda. It is directed especially towards the entomological course of this department, and is required of all students expecting to take entomology. The laboratory work includes a special study of the crayfish, and of the embryology of the potato beetle, followed by a considerable amount of semi-independent work upon the invertebrate fresh water fauna of the region.

c. The third term's work is done on vertebrates, with principal attention in the laboratory to anatomical work on the larger animals. The general method is that of comparative anatomy, with special reference to the anatomy of man, this part of the course being directed particularly towards the physiological courses of the University which follow upon it. Philosophical zoölogy takes the form in this term of a course of lectures on the general theory of organic development, illustrated by a systematic study, by lectures and reading, of the modern doctrine of the descent of man. *Winter, spring, and fall terms, full study.* Assistant Professor FRANK SMITH (a and b) and Associate Professor SUMMERS (*c*).

Required: An entrance credit in Chemistry, or Chemistry 1, an entrance credit in Zoölogy, or Zoölogy 10. Art and Design 1 must be taken with this course if it has not been taken previously.

2. This course consists of the first and second terms' work of Zoölogy 1. It is intended especially to serve as a thorough zoölogical preparation for General Entomology (Zoölogy 6). It will be accepted as a minor instead of Zoölogy 10. *Winter and spring terms, full study.*

Required: Chemistry 1 and Art and Design 1 (see Course 1).

3. This course consists of the first and third terms' work of course 1. It is intended to serve as a thorough zoölogical preparation for Physiology 1, and is especially commended to students contemplating the study of medicine. *Winter and fall terms, full study.*

Required: Chemistry 1 and Art and Design 1 (see Course 1).

4. EMBRYOLOGY.—Lectures, laboratory, and reference work. This course begins with a study of the germ cells, and the process of maturaion, fertilization, cleavage, and gastrulation from preparations furnished to the student. The study of the development of the vertebrate form in the chick is then taken up, with preparations of the amphibian embryo for comparison. Instruction is given in methods of preparing embryological material, and of making graphic and plastic reconstructions from serial sections. *Hertwig-Marks' Embryology of Man and Mammals and Marshall's Vertebrate Embryology. Winter term, full study.* Dr. KOFOID.

Required: Zoölogy 1 or 3.

5. ADVANCED ZOÖLOGY.—To students who have had Course 1, 2, or 3, an opportunity is offered for advanced work in zoölogy. It may be closely adapted to the bent and ability of the student. Four main lines of work will, however, be especially provided for: (a) Systematic reading of general zoölogy (at present Hertwig's Lehrbuch der Zoölogie), together with lectures on the history of zoölogy and on the morphology, physiology, and œcology of special groups. (b) Seminary work, consisting of the collating, indexing, and abstracting of a scattered literature on assigned or selected subjects, and the preparation of papers based on these bibliographical and literary studies. These papers will be closely criticised and discussed as a means of education in the preparation of scientific manuscript for the press. Regular instruction in natural history drawing sufficient to enable the student to prepare illustrations for reproduction by the ordinary methods will be made a part of this course. (c) Zoölogical research work, which will usually take the form of an original investigation of a limited subject, carried forward with whatever aid, guidance, and instruction, the nature of the subject and the ability of the student may require. It is the purpose of this course to make the student acquainted with the general method of science and to prepare him for the thesis investigation of the senior year. Students so desiring may pursue a research course at the University Biological Station on the Illinois River during the summer vacation months, and will receive credit therefor. (d) Pedagogical zoölogy, offered with special reference to those who wish to become teachers of biological subjects. This course will be conducted in coöperation with the department of pedagogy.

Any one of these four lines of work may be taken separately, proportional credit to be given therefor. Seminary and research courses will, however, be required of all students purposing to graduate with a zoölogical thesis. *Fall, winter, and spring terms, full study.* Professor FORBES.

Required: Zoölogy 1, 2, or 3.

6. GENERAL ENTOMOLOGY.—This course of two terms should be taken by preference in the sophomore year. It is practically a sequel to course 2 in general zoölogy, the work of the second term of that course being directed especially towards entomology.

Presuming upon a general knowledge of the Arthropoda, the instruction begins with more detailed work on Insecta. The greater part of the course consists of laboratory studies of the structure and classification of insects; practice in the determination of species and the description and illustration of species and structures; field work and observation, including the collection of specimens of all orders and stages, aquatic and terrestrial; office work in the preparation, labeling, and arrangement of collections; a systematic independent study of life histories of selected species, with full records, descriptions, and drawings; experimental insecticide work, and library practice in collecting, collating, indexing, and abstracting the literature of the species principally studied, concluding with a thesis on a single species studied both biologically and experimentally. Special instruction is given in this course in the art of entomological illustration, under the supervision of an expert zoölogical artist.

It is intended that the student shall come through this course accomplished in all the methods of the zoölogical laboratory as applied to entomology, competent to determine, to draw, and to describe species, and experienced in the various operations of field, laboratory, library, and economic entomology. *Winter and spring terms, full study.* Professor FORBES.

Required: Zoölogy 1, 2, or 5.

7. ADVANCED ENTOMOLOGY.—Special courses will be arranged in either technical or practical entomology for students wishing to specialize extensively in this direction, and to such students the facilities of the State Laboratory of Natural History and of the State Entomologist's office will be freely open. Special provision will be made for the instruction and supervision of students desiring to fit themselves for the investigation of the contagious diseases of insects. *Fall, winter, and spring terms, full study.* Professor FORBES.

Required: Zoölogy 5.

8. Practical Entomology.—This is a single term's work open, without conditions precedent, to University students, but offered for the special benefit of students in agriculture. By means of laboratory studies and lectures and field and insectary observations, students will be made familiar with the commonest and most important injurious insects, and with means of preventing or arresting their injuries. *Spring term, full study.* Professor Forbes.

9. Thesis Investigation.—Candidates for graduation in the College of Science who select a zoölogical subject as a thesis are required to spend at least three hours a day during their senior year in making an investigation of some selected zoölogical subject. While this work is done under the general supervision of an instructor, it is in its methods and responsibilities essentially original work. *Fall, winter, and spring terms, full study.* Professor Forbes.

Required: 2 years' major work in zoölogical courses, including Zoölogy 5b and 5c.

10. Elementary Zoölogy.—This is a laboratory and lecture course on the morphology, physiology, and œcology of types selected from the animal kingdom. The work is so directed as to lead to a general acquaintance with zoölogical science, and to serve as a preparation for the more extensive and thorough work of zoölogy 1. It is offered as a minor to students in the College of Science not specializing in zoölogy, and as an unconditioned elective to members of other colleges. *Fall term, full study.* Assistant Professor Frank Smith.

11. Elementary Entomology.—This is a laboratory and lecture course in general entomology, open to all University students, pursued without especial reference to economic ends, complete in itself, but leading to the major course in entomology (zoölogy 6). It is especially commended to prospective teachers of natural science and to general students who wish a brief but thoroughgoing experience in some department of natural history. *Fall term, full study.* Professor Forbes.

COURSES FOR GRADUATES

101. Systematic and Faunistic Zoölogy.—This course consists of studies of invertebrate animals (including insects), and of aquatic vertebrates, so directed as to give as nearly as possible an exhaustive knowledge of a taxonomic group or of a selected geographic assemblage. If a suitable taxonomic group is chosen, its space and number relations within a definite area will be thoroughly worked out by the precise methods of modern faunistic zoölogy, including quantitative collections made by uniform methods at regular periods, and the compara-

tive measurement or enumeration of such collections. A study by this means of local and periodic variations in number and distribution will lay the foundations for work in the following course. If a geographic assemblage be selected, critical determinative work will be followed by both qualitative and quantitative studies of the various groups associated, with a view to accumulating data for an examination of the interactions of the assemblage.

102. ADVANCED ECONOMIC ENTOMOLOGY.—This is a research course in systematic and experimental entomology which involves the application to insects injurious to agriculture and horticulture of the methods and general ideas of the preceding course. It is intended to prepare students in a thoroughgoing manner for first-class investigation work in this field, and for the direction of entomological operations in agricultural experiment stations.

DEGREES

BACHELORS' DEGREES

The usual bachelors' degrees are conferred upon those who satisfactorily complete the courses of study described under the different colleges. A candidate for a bachelor's degree must pass in the subjects marked *prescribed* in his chosen course, and must conform to the directions given in connection with that course in regard to electives. In the Colleges of Literature and Arts, of Science, and of Agriculture, 40 term-credits are required for graduation. In the College of Engineering the candidate must complete the course of study as laid down. The number of credits required includes two for military science for men, and for women *may* include the same number for physical training. Men excused from the military requirements, and women who do not take courses in physical training, must elect in lieu thereof two extra terms' work in other subjects.

In all cases in which a thesis is required,* the subject must be announced not later than the first Monday in November, and the completed thesis must be submitted to the dean of the proper college by June 1st. The work must be done under the direction of the professor in whose department the subject naturally belongs, and must be in the line of the course of study for which a degree is expected. The thesis must be presented upon regulation paper, and will be deposited in the library of the University.

1. The degree of Bachelor of Arts is given to those who complete a course in the College of Literature and Arts.

2. The degree of Bachelor of Science is given to those who complete a course in the College of Engineering, of Science, or of Agriculture. The name of the course will be inserted in the diploma.

*See requirements for graduation in the different colleges.

ADVANCED DEGREES

No degrees are given for study *in absentia*, except that graduates of this University, who become members of the Graduate School and reside elsewhere, may receive a second degree, upon the completion of their courses of study within not less than three years of the date of registration. For a graduate of this University who has won recognized distinction in a special line of investigation, and who otherwise fulfills the conditions for a doctor's degree, the requirements of residence for that degree will be such as may be imposed by the General Faculty of the University, on presentation of the case by the Council of Administration. Advanced degrees are conferred by the Trustees of the University only upon recommendation of the General Faculty, based upon information furnished by the Council of Administration.

SECOND DEGREES

The second degrees conferred by this University are as follows:

Master of Arts, after Bachelor of Arts in courses of the College of Literature and Arts.

Master of Science, after Bachelor of Science in courses of the Colleges of Agriculture and Science.

Master of Architecture, after Bachelor of Science in courses in Architecture and Architectural Engineering.

Civil Engineer, after Bachelor of Science in the course in Civil Engineering.

Electrical Engineer, after Bachelor of Science in the course in Electrical Engineering.

Mechanical Engineer, after Bachelor of Science in the course in Mechanical Engineering.

Graduates of other colleges and universities having equivalent requirements for baccalaureate degrees may be given second degrees determined in kind by comparison with the usage described above.

All candidates for second degrees are required to register in the Graduate School; to conform to the conditions outlined under "Admission," "Registration," and "Examinations" [p. 36]; to pursue an approved course of study for one academic year in residence, or, in the case of graduates of this University, for three years *in absentia;* and to pass

satisfactory examinations upon all the studies of the approved course.

Each candidate for a second degree must present an acceptable thesis in the line of his major subject of study. The subject of this thesis must be announced to the Dean of the General Faculty not later than the first Monday in November of the academic year in which the course is to be completed. The completed thesis, upon regulation paper, must be presented, with the certified approval of the professor in charge, to the Council of Administration not later than June 1st.

The period of required study begins from the date of registration in the Graduate School.

DOCTOR'S DEGREE

The degree of Doctor of Philosophy may be conferred upon any member of the Graduate School of not less than three years' standing who shall have reached high attainments in scholarship, including a sufficient knowledge of the Latin, French, and German languages to serve the purposes of research in his principal specialty, who shall have shown marked ability in some line of literary or scientific investigation, and shall have presented a thesis giving clear indications of such scholarship and of such power of research. At least the first two, or the last one, of the three years of study must be in residence at the University, and the entire course of study must be in accordance with the regulations of the Graduate School.

The time and study required for a master's degree may be included in the three years required, but approval of a course of study for a doctor's degree must be upon the condition that the candidate is prepared through his baccalaureate work, or otherwise, to enter at once upon advanced studies in the line of his major subject, and that work on this major subject be continued through the three years.

The final examination of a candidate for the doctor's degree is conducted by a committee consisting of the head of the department under which the major subject has been pursued, as chairman, and of not less than two additional members of the General Faculty of the University, appointed for the purpose by the Council of Administration. This exam-

ination covers the subjects of the course approved for the degree, but is specially searching upon that on which the major work has been done. This examination occurs in the week preceding that upon which commencement day occurs.

Each candidate for a doctor's degree must announce to the Dean of the General Faculty a thesis subject not later than the first Monday in November of the academic year at the close of which the award of the degree is expected. A fair copy of the thesis must be submitted, with a certified approval of the committee on examinations, to the Council of Administration not later than the first day of June. If the thesis is approved by the Council the candidate must have it printed and must deposit not less than one hundred copies with the librarian of the University.

FELLOWSHIPS

8 × 300

The Trustees of the University have established eight fellowships, each with a stipend of three hundred dollars, payable in ten monthly installments.

The rules governing appointments to these fellowships are as follows:

1. The purpose of these fellowships shall be to promote advanced scholarship and original research in the University.

2. The fellowships shall be open to graduates of this and similar institutions. Those who are to complete an undergraduate course previous to the academic year for which appointments are made shall be eligible, with others, as candidates.

3. Nominations to fellowships, accompanied by assignments to special departments of the University for instructional work, shall be made by the Council of Administration to the Trustees of the University, upon applications received by the President of the University each year, not later than the twenty-fifth day of April. These nominations shall be made at a meeting of the Council called for that purpose within the month of May. The appointments by the Trustees are made at their regular meeting in June, and shall take effect the first day of the following September. Vacancies may be filled by similar nominations and appointments at other times.

4. Nominations to fellowships shall be made upon the grounds of worthiness of character, scholastic attainments, and promise of success in the principal line of study or research to which the candidate proposes to devote himself. Consideration shall also be given to the probable value or usefulness of the services of the candidate as an assistant in instruction, but this shall not be deemed the primary object of the appointment. Other things being equal, preference shall be given to those graduates of this University who have pursued a specialized course.*

5. Candidates must present, with their applications, full information concerning themselves and their qualifications for advanced study and research work, including any written or printed essays or results of investigation, and must name the subject in which they wish to do their major work.

6. Fellowships shall be good for one year. Appointments may not be usually renewed to the same persons, and in no case for more than one additional year; but an appointment as *honorary fellow*, without stipend, may be made as specified for paid fellowships in the case of any one who has held a regular fellowship and has shown distinguished merit in his work.

7. Fellows shall be constituted members of the Graduate School, shall have all of the privileges and bear all of the responsibilities of such membership. Each regular fellow may be called upon to render service in instruction throughout the year in the department in which his major subject lies, equal to one hour daily of class instruction or to two hours daily of laboratory supervision. Such service may receive such credit as the Council of Administration may determine in each case. Blank forms for applications may be obtained by addressing the Registrar.

SCHOLARSHIPS

STATE†

A law passed by the General Assembly of the State of Illinois at the session of 1895 provides that there shall be

*See pp. 44, 96. All members of the Colleges of Engineering and of Agriculture and of the chemical and mathematical groups in the College of Science shall be considered as pursuing specialized courses.

†These scholarships replace the honorary scholarships and the accredited school scholarships heretofore given.

awarded annually to each county of the state one state scholarship, which shall entitle the holder thereof, who shall be a resident of the senatorial district to which he is accredited, to instruction in any or all departments of the University of Illinois for a term of four years, free from any charge for tuition or any incidental charge, unless such incidental charge shall have been made for materials used or for damages needlessly done to property of the University; *Provided*, that in counties having two or more senatorial districts there shall be awarded annually one additional scholarship for each of said senatorial districts.

A competitive examination under the direction of the Superintendent of Public Instruction shall be held at the county courthouse in each county of the state upon the first Saturday of June in each and every year by the county superintendent of schools upon such branches of study as said Superintendent of Public Instruction and the President of said University may deem best.

Questions for such examinations shall be prepared and furnished by the President of the University to the Superintendent of Public Instruction, who shall attend to the printing and distribution thereof to the several county superintendents of schools prior to such examinations.

The law also provides that in case the scholarship in any county is not claimed by a resident of that county, the Superintendent of Public Instruction may fill the same by appointing some candidate first entitled to a vacancy in some other county.

Candidates to be eligible to a state scholarship must be at least sixteen years of age, and must have been residents of their respective counties for the year preceding the examination.

A student holding a state scholarship who shall make it appear to the satisfaction of the President of the University that he requires leave of absence for the purpose of earning funds to defray his expenses while in attendance may, in the discretion of the President, be granted such a leave of absence, and may be allowed a period not exceeding six years from the commencement thereof for the completion of his course at said University.

The law contemplates that the candidate who passes this

competitive examination should afterwards pass the regular entrance examination to the University. It has been thought best to combine these examinations so that the successful candidate may be admitted to the University without further examination. To this end the examination will be held on the first Saturday in June and the Friday preceding (June 4, 5, 1897, and June 3 and 4, 1898). The subjects for examination will be the same as stated under the head of "Admission by Examination," pp. 29-35.

Any person, whether a candidate for a scholarship or not, may be examined for admission to the University at these state scholarship examinations.

MILITARY

Students who have gained six term-credits in class room military instruction and six such credits in drill practice, are eligible for appointment as commissioned officers of the battalion. Those attaining this rank may have awarded them special scholarships, good for one year, and equal in value to the University term fees for the same length of time.

PRIZES

THE HAZLETON PRIZE MEDAL

Capt. W. C. Hazleton provided in 1890 a medal, of beautiful and artistic design, which is to be awarded at a competitive drill to be held near the close of the year, to the best drilled student. Each competitor must have been in attendance at the University at least sixteen weeks of the current college year; must not have had more than four unexcused absences from drill; and must present himself for competition in full uniform.

The award is made for excellence in these particulars:

1. Erectness of carriage, military appearance, and neatness.
2. Execution of the school of the soldier, without arms.
3. Manual of arms, with and without numbers.

The successful competitor will receive a certificate setting forth the facts, and may wear the medal until the 15th day of May following, when it will be returned for the next competition.

IN ORATORY

The Trustees of the University appropriate the sum of one hundred dollars for prizes in debate during the year. The amount is divided into three prizes, of fifty, thirty, and twenty, dollars, respectively, and these are awarded to the three participants in the debate whose work is adjudged best.

The debate is held some time in the month of February. A preliminary contest takes place in December, and is open to all members of the three upper classes. From the list of contestants in the preliminary debate six are selected to take part in the final competition.

INTERSCHOLASTIC ORATORICAL CONTEST

A medal of the value of twenty dollars is offered annually by the University to the high schools of the state for the best oration delivered in a competitive contest between their representatives. This contest takes place in the spring at the time of the interscholastic athletic meet.

BENEFICIARY AID

CHICAGO CLUB LOAN FUND

The Chicago Club of the University of Illinois offers two loans of $250.00 each, payable to the beneficiary, $100.00 the first year, $75.00 the second year, $50.00 the third year, and $25.00 the fourth year. The loans are offered to residents of Cook County, Illinois, only, and are to be awarded upon competitive examination to those obtaining the highest average grades. The loans are due six years after matriculation. They bear no interest while the student is in the University, but six per cent. after graduation. The examination questions are prepared at the University and cover the same subjects as those for the honorary scholarships.

The beneficiaries of this fund also have their incidental fees, amounting to $22.50 a year, remitted by the trustees.

CLASS OF 1895 LOAN FUND

This is a fund of $250.00, established by the class of 1895, to be loaned to needy and deserving students. Accord-

ing to the conditions of the gift, one-fifth of the amount is to be loaned annually, and is open only to members of the freshmen class. No person may receive the benefit of the fund more than four years. The loan bears interest at the legal rate from the time the recipient leaves the University, and is due, one-half in five years, and one-half in six years, after matriculation. The management of the fund is in charge of the Council of Administration.

SOCIETIES AND CLUBS

LITERARY SOCIETIES

The Literary Societies have from the opening of the University enjoyed its fostering care.

The Adelphic and Philomathean societies for men, and the Alethenai for women, occupy spacious halls, which the members have furnished and decorated with taste and elegance. Meetings are held Friday evenings throughout term time, are well attended, and are maintained with interest. They furnish excellent drill in writing, speaking, and parliamentary methods.

THE CHRISTIAN ASSOCIATIONS

Both the Young Men's and Young Women's Christian Associations are active and useful organizations, and have a large membership.

Subscriptions have been made by students and graduates, amounting to $23,000.00, towards a new building for these organizations. A canvass has been started outside with the hope of raising the sum to $32,000.00. If this is successful the building will be begun at once. An excellent site has been purchased.

CLUBS AUXILIARY TO COURSES OF STUDY

AGRICULTURAL CLUB

This Club meets semi-monthly. It is devoted to the discussion of topics of theoretical and practical interestto students of agriculture. All students in the College of Agriculture are eligible to membership.

ARCHITECTS' CLUB

This Club meets once in two weeks for the consideration of current topics of architectural interest and subjects connected with the study of architectural history. All students pursuing architectural studies are eligible to membership.

CIVIL ENGINEERING CLUB

This Club meets the second and fourth Saturday evenings of each month for the reading and discussion of papers relating to civil engineering. All students pursuing the civil engineering course may become members.

THE ENGLISH CLUB

The English Club is composed of members of the Faculty, and of students who have done especially good work in English. The work of the club is confined to the study of recent writers of fiction and poetry. The membership is limited to thirty. Meetings are held on the second Tuesday of each month.

FRENCH CLUB

Le Cercle Français embraces students who have had at least one year's work in French. The club meets once a week throughout the year. Its proceedings are conducted in French, the object being to supplement the work of the class room by the practical handling and understanding of the language.

THE LATIN CLUB

This is an organization for the purpose of promoting interest in the language and institutions of the Roman world. It meets once in two weeks.

MECHANICAL AND ELECTRICAL ENGINEERING SOCIETY

This club meets on the first and third Saturday evenings of each month.

All students pursuing mechanical and electrical engineering studies are eligible as members. Papers relating to subjects of interest to members are presented and discussed at each meeting.

MEDICAL CLUB

The Students' Medical Club is composed of students, irrespective of courses and departments, who are preparing for

medical study, or who are for any reason interested in medical subjects. Its programs consist of lectures by members of the biological faculty and by physicians, and of papers prepared by members of the Club. It meets weekly.

MUSICAL CLUBS

The University Glee Club is an organization for men, and is open to all male students who have good voices and can read music. From this organization a club of sixteen members is chosen, which gives concerts from time to time during the year. The entire Club meets once a week for rehearsal, and is under the direction of the head of the music department.

The Young Ladies' Glee Club is an organization for the young ladies of the University, and is in charge of the vocal department.

The Mandolin and Guitar Club is open to young men who play these instruments. Final membership is decided by competition, and those who become members are associated with the Glee Club in all its concerts.

The Military Band is an organization which has already attained a high degree of excellence. It gives one or two concerts during the year, plays on public occasions, and furnishes the music for battalion drill of the Military department.

The University Chorus is organized with a view to arousing a musical spirit in the University, and is free to all students. It meets once a week for rehearsal of songs and choruses from the oratorios.

ZOÖLOGICAL CLUB

The University Zoölogical Club is composed of advanced students and instructors in the zoölogical and physiological departments, together with such other biological instructors and advanced students as are interested in its subjects. Its sessions are devoted to the presentation and discussion of abstracts of recent biological literature and of the results of investigation by the members of the club. It meets weekly in Natural History Hall.

SPECIAL ADVANTAGES FOR WOMEN

HOUSEHOLD ECONOMICS

No course of study is specifically outlined in household economics, but there are certain courses offered regularly, a combination of which affords the student a fair training in some branches of the subject. Such credit is given in each course as the work done justifies. The following courses may be mentioned.

1. Bacteriology (Botany 2). Those who take this course under household economics will devote their time to problems which come specifically within the range of household economy; fermentation in bread baking and other cooking processes, will receive special attention. Those who take the course must have had elementary botany or a course in zoölogy.

2. Chemistry of foodstuffs (Chem. 5c and 18). This course is devoted to the analysis of foodstuffs, the sanitary examination of air, tests for adulteration, etc. The chemical changes in the various processes of cooking will also be studied. At least one year's study of chemistry (3 credits) is necessary to take the course with success.

3. Physiology. This is the first term's work in advanced physiology (Physiology 2). It treats especially of the physiology of digestion, the digestibility of various foods, and proper methods of cooking with reference to digestibility.

In addition to this course, there is a course of lectures on such subjects as ventilation, contagious diseases and their treatment, which is of high practical value (see Physical Training 4).

4. Household decoration. The subject of art in the home is one of far-reaching importance; exceptional opportunities for its study are offered in the departments of Art and Design and of Architecture. The course in the "Esthetics of Architecture" (Arch. 18) is devoted in part to the subject of decoration in the home.

5. Designing of residences. This is part of the regular course in Architectural Designing (Arch. 15). Young women are permitted to attend the lectures and to do the text-book work and receive credit therefor, but are not required to make the working drawings.

THE FINE ARTS

DRAWING AND PAINTING

Four years' work is offered in drawing, modeling, and painting. The student has large opportunity to specialize, either in pencil, crayon, pen and ink, or in oil or water colors. A detailed description of the courses is given on pages 131–3. Students may enter for the study of art alone.

MUSIC

Full courses in vocal and instrumental music, including piano, organ, and violin, are offered. As in the case of drawing and painting, students may pursue the study of music by itself.

PHYSICAL TRAINING

A special gymnasium is set apart for the young women, and physical training, under a competent instructor, is a part of the regularly accredited work of the University.

Careful attention is given to the correction of physical defects, to the promotion of good health, and to the development of a graceful carriage. In connection with the physical exercise, a course of lectures is provided, devoted especially to the proper care of health and the treatment of the more common bodily ailments.

SOCIAL ADVANTAGES

Educational training in the conventionalities is provided for in a practical way by the numerous social gatherings offered especially for the young women of the University by the wives of members of the Faculty and by the lady members of the same.

ACCREDITED HIGH SCHOOL WORK

When a high school does so good work in some or all of the subjects required for admission to the University that its graduates are excused from entrance examinations in such subjects, the school is said to be accredited in those subjects. The University employs a high school visitor, whose business it is to inspect the high schools of the State. When his report on a school is favorable, and is approved by the Accredited School Committee and the Faculty, the school is accredited for the subjects which he recommends. The University bears the expense of such inspection, but does not send the visitor to any school whose report does not make it evident that the school is doing work, in quantity and quality, worthy of the time and attention of the University. Between this lower limit and the highest amount of work required for full admission, the University accredits *all work which is sufficiently well done. The following schools are, therefore, not accredited for the same amount and kind of work.* The specific credits are reported to the proper authorities when the school is accredited. In all subjects other than those for which his school is accredited, which are required for admission to the department of the University that he desires to enter, the student must pass an examination, or take the work in the Preparatory School of the University.

LIST OF ACCREDITED SCHOOLS

School	Superintendent	Principal
Aledo	P. J. Kuntz	Charlotte Stetson
Alton	R. A. Haight	J. E. Turner
Arcola	G. W. Smith	Maude C. Bristol
Atlanta	Henry H. Edmonds	Ida F. Hopkins
Augusta	H. M. Anderson	J. G. Moore
Aurora—East	C. M. Bardwell	Wm. J. Pringle
Aurora—West	A. V. Greenman	Katherine Reynolds
Austin	N. D. Gilbert	B. F. Buck
Batavia—West	E. M. Harris	Alice Downing
Beardstown	D. T. Harris	Elva J. Saunders
Belleville	H. D. Updike	H. W. Brua

School	Superintendent	Principal
Belvidere—North	H. A. Warren	Flora Fellows
Belvidere—South	R. V. DeGroff	Carrie A. Longley
Bement	Chas. McIntosh	W. N. Tobie
Bloomington	E. M. Van Petten	Edwin L. Boyer
Blue Island	J. E. Lemon	J. E. Lemon
Cairo	T. C. Clendenen	John Snyder
Camp Point	C. E. Beale	Helen M. Grubb
Canton	S. S. Beggs	C. S. Aldrich
Carrolton	Clyde Stone	Lottie Weber
Carthage	W. K. Hill	Miss Bell
Centralia	Irwin F. Mather	Merton D. Cox
Champaign	Joseph Carter	Lottie Switzer
Charleston	W. T. Gooden	Wm. Wallis
Chicago—		
Calumet	Albert G. Lane	A. S. Hall
Englewood	"	J. E. Armstrong
English High and Manual Training,	"	A. R. Robinson
Hyde Park	"	C. W. French
Jefferson	"	C. A. Cook
Lake	"	E. F. Stearns
Lake View	"	Jas. H. Norton
Marshall	"	L. J. Block
Medill	"	S. B. Sabin
North Division	"	O. S. Wescott
Northwest Div.	"	Franklin P. Fisk
South Division	"	Jeremiah Slocum
South Chicago	"	Chas. I. Parker
West Division	"	G. M. Clayberg
Chicago—Manual Training,	H. H. Belfield,	Director
Clinton	J. W. Hesler	Minnie M. Bishop
Clinton, Ia.	O. P. Bostwick	E. L. Mason
Danville	J. E. Bryan	S. A. D. Harry
Davenport, Ia.	J. B. Young	H. H. Roberts
Decatur	E. A. Gastman	J. J. Sheppard
Delavan	F. L. Calkins	Stella Hoghton
Dixon—North	E. C. Smith	Mrs. Lydia Williamson
Dixon—South	Wm. Jenkins	Lillian Deming
Dubuque, Ia.	F. T. Oldt	F. L. Smart
Dundee	S. M. Abbot	Julia M. Gay

School	Superintendent	Principal
DuQuoin	J. E. Wooters	D. B. Rawlins
East St. Louis	John Richeson	John Richeson
Edwardsville	J. M. Parkinson	J. M. Osborn
Effingham	I. A. Smothers	E. C. Finley
Elgin	M. A. Whitney	E. C. Pierce
Elmwood	L. E. Flanegin	Jeanette C. Munson
El Paso	Anna E. Hill	Rose M. Hayden
Evanston	(Township High School)	H. L. Boltwood
Farmer City	C. C. Covey	C. C. Covey
Flora	J. L. Hughes	E. A. Miner
Freeport	R. S. Page	J. W. Bray
Fulton	A. Ebersole	Ella M. Brophy
Galena	J. A. Harley	C. C. Coulter
Galesburg	W. L. Steele	Frank D. Thomson
Galva	F. U. White	Hedwig Maul
Geneseo	A. W. Hussey	Ada M. Schnabele
Gibson City	R. G. Jones	Samuel Garvin
Greenfield	A. D. Snyder	Clyde Travis
Griggsville	H. C. McCarrel	Lucy Clanahan
Harvard	Chas. W. Groves	Anna M. Morrow
Harvey	F. L. Miller	J. E. Cable
Henry	W. S. Wallace	Gertrude Hull
Hillsboro	Josiah Bixler	Mattie Hunt
Hinsdale	J. M. Frost	Emma C. Bates
Hoopeston	H. G. Strawn	B. E. Ford
Jacksonville	J. W. Henninger	Virginia Graves
Jerseyville	J. Pike	Edward B. Shafer
Joliet	W. H. Campbell	J. Stanley Brown
Kankakee	F. N. Tracy	Eugene C. Crosby
Keokuk, Ia.	O. W. Meyer	G. E. Marshall
Kewanee	A. C. Butler	H. S. Latham
Lacon	W. E. Davis	Grace E. Germain
La Grange	(Township High School)	E. G. Cooley
Lanark	E. S. Hady	Louise C. Winner
LeRoy	B. C. Moore	Bertha Rutledge
Lewistown	Burton E. Nelson	Hattie M. Wasmuth
Lexington	Jessie L. Smith	Jessie L, Smith
Lincoln	C. W. Harriman	Jane Kidd
Litchfield	J. E. Wooters	R. C. Shelenbarger
Lockport	Joseph Hooton	F. M. Chowning

School	Superintendent	Principal
Macomb	R. C. Rennick	Joseph Hays
Marengo	John Nelson	W. McDermott
Mason City	C. O. Du Bois	Mrs. C. O. DuBois
Mattoon	B. F. Armitage	E. Kate Carman
Maywood	J. Porter Adams	H. A. Owen
Mendota—East	Wm. R. Foster	Lillian Purkhiser
Mendota—West	S. E. Beede	Myra J. Howes
Moline	H. M. Slauson	W. J. Cox
Monmouth	James C. Burns	W. D. McDowell
Monticello	J. H. Meneeley	A. B. Wight
Morrison	M. M. Warner	P. F. Burtch
Mound City	J. M. McKinney	J. M. McKinney
Mt. Carmel	J. T. Dobell	Minnie Harris
Murphysboro	C. W. Parkinson	E. H. Rogers
Nashville	J. B. Bundy	R. H. Perrot
Normal	E. A. Fritter	T. M. Birney
Oak Park	W. H. Hatch	D. O. Barto
Olney	O. J. Bainum	G. D. Wham
Oregon	W. J. Sutherland	Addie Steele
Ottawa	(Township High School)	J. O. Leslie
Paris	J. D. Shoop	Nellie McCarty
Paxton	J. M. Robinson	Isabel Baird
Pekin	J. A. Hornberger	Josephine Goodheart
Peoria	N. C. Dougherty	A. W. Beasley
Pittsfield	W. B. Davis	Carrie Grote
Polo	I. M. Bridgman	Alice F. Bridgman
Pontiac	(Township High School)	J. E. Bangs
Princeton	(Township High School)	W. A. Pratt
Quincy	T. W. Macfall	Wm. F. Geiger
Ridge Farm	F. P. Burchit	F. P. Burchit
Rochelle	C. F. Philbrook	Minnie G. Steele
Rockford	P. R. Walker	B. D. Parker
Rock Island	R. G. Young	Walter N. Halsey
Roodhouse	P. M. Silloway	Elmer E. Wattack
Rossville	J. S. Ragsdale	C. M. Boord
Savanna	B. F. Hendricks	Jennie Wright
Shelbyville	T. A. Hillyer	Jennie Good
Sparta	S. B. Hood	J. M. Nickles
Springfield	J. H. Collins	Wm. Helmle
Sterling—3d Dis't	H. L. Chaplin	Anna Parmelee

School	Superintendent	Principal
Sterling—Wallace	S. B. Hursh	Harriet E. Ives
Streator	(Township High School)	Alfred Bayliss
Sullivan	J. M. Martin	Ella Lowe
Taylorville	(Township High School)	W. E. Andrews
Terre Haute, Ind.	Wm. Wiley	Chas. Meek
Tuscola	A. G. Owens	Chas. S. Earle
Upper Alton	(Western Military Academy) Col. Willis Brown	Albert M. Jackson
Urbana	J. W. Hays	H. T. Wilson
Vienna	M. N. McCartney	Laura Truscott
Virden	P. H. Boulton	A. Maria Lloyd
Virginia	C. V. McReynolds	Lydia G. Clark
Warren	W. C. Smith	O. M. Buser
Washington	H. W. Veach	Miss Snedeker
Waukegan	Frank H. Hall	Emily M. Coon
Wheaton	J. B. Russell	H. O. Staufft
Wilmington	J. J. Eckman	Helen J. Buss
Winchester	J. M. Jeffords	Hattie Hulick
Woodstock	C. W. Hart	Mary Richards
Wyoming	J. M. Hutchison	Emma Lee
Yorkville	Richard Heywood	Mabel W. Barrett

MILITARY SCIENCE

The military instruction is under the charge of a graduate of the U. S. Military Academy, and officer of the regular army of the United States. The course as a whole has special reference to the duties of officers of the line. A full supply of arms and ammunition is furnished by the War Department, including 300 cadet rifles and accoutrements, and two field pieces of artillery.

Every male student, able to perform military duty, and not excused for sufficient cause, is required to drill twice each week until he has gained six creditable term-records. He is also required to study Drill Regulations for Infantry and to recite upon the same once a week until he passes two creditable term-examinations. This practical instruction begins as soon as possible after he enters the University; but a preparatory student carrying no freshman studies and not expecting to matriculate during the year, is not permitted to drill. The standings in study and drill are placed on record,

with other class credits; two terms of recitations and drill count one credit, and the four remaining terms of drill another, and are requisite to graduation in every University course.

Appointments in the battalion are made on nomination by the professor in charge and confirmation by the Faculty.

Students who have passed two examinations in the drill regulations and who have gained two term-credits in drill practice are eligible for corporals; those having three term-credits in each are eligible for sergeants, and those having six term-credits in each, for lieutenants and for officers of higher rank.

The battalion (six companies) is composed mainly of the members of the freshman and sophomore classes, the first supplying the corporals, the second, the sergeants, while the captains and lieutenants are taken from those of the junior and senior classes who have passed through the lower grades satisfactorily.

A special military scholarship, good for one year, is open to each student who attains the grade of a commissioned officer, the value of which is paid the holder at the close of the year.

An artillery detachment is organized mainly from the second year, or sophomore, class, which receives practical instruction twice each week during the college year.

Towards the close of the spring term, a committee appointed by the Faculty examines candidates for nomination to the Governor of the state to receive commissions as brevet captains in the state militia. Candidates must be members of the senior class in full standing at the time of this examination; must have completed the course of military studies; must have served three terms as captains or lieutenants, and must be approved by the Faculty as having good reputations as scholars, officers, and gentlemen.

Under the authority of the acts of incorporation, the Trustees have prescribed a uniform of cadet gray, coat trimmed with black mohair braid, trousers with black cloth stripe, cut after the U. S. army pattern. The uniform of the cadet officers is of dark blue cloth for coat and light blue for trousers; cap for all of dark blue cloth, army pattern, with university badge embroidered thereon in gold bullion; white

gloves; the uniform of the band dark blue throughout, with special trimmings.

The University Cornet Band is composed of students, and every full term of service therein is counted as one term of drill.

PHYSICAL TRAINING

The object of the Department of Physical Training is to teach and to put into practice the best methods of preserving health, of gaining physical vigor, of correcting imperfect development, and of avoiding injury and disease. Careful physical examinations are made, and special exercises are prescribed to suit individual cases. Special attention is given to those who do not reach the normal in strength or in harmonious bodily development. Certificates of the proper examiner are required for membership in the athletic teams. Credits towards graduation are given for the completion of the work described in the description of courses.

Men and women have their practice and much of their instruction separately in physical training, but all students have equal consideration in the provisions made for the work and in the freedom of choice under the necessary regulations.

FOR MEN

The gymnasium for men—Military Hall—has a floor space of 100 x 150 feet, affording free room for developing apparatus, ball courts, running track, dressing rooms, and baths. The adjoining "Illinois Field" serves admirably well for games and for track purposes, and here take place intercollegiate contests, under favorable conditions, in football, baseball, track athletics, and tennis.

FOR WOMEN

Each student who takes physical instruction is expected to undergo a physical examination every year, in order that her physical condition may be known and suitable exercises and advice given. Systematic class work is given in the use of dumb-bells, wands, bar-bells, foils, Indian clubs, and on all pieces of gymnastic apparatus.

During the fall and spring terms, outdoor games and exercises receive considerable attention; during the winter term, indoor games and athletic work are made interesting

by public entertainments. Lectures and talks on hygiene, physical training, etc., are given during the winter term.

Special attention is given to the correction of those inequalities of hips, shoulders, and vertebræ which prevent the harmonious development of the body. Each student comes under the personal observation of the director and is given exercises to meet her special needs.

Every woman student not physically disqualified may take this work. If taken for credit, the conditions laid down under Physical Training in the description of courses must be complied with.

The women's gymnasium occupies very attractive quarters in Natural History Hall, and is well equipped. The pastime grounds near by, in use through the year, when the weather permits, have a sixteen-lap running track, eight tennis courts, two basket ball fields, and space for hurdling, handball, and other suitable amusements.

The gymnasium is open for exercise, at certain hours, under suitable restrictions, to those who are not enrolled in classes.

EXPENSES

BOARD

The University does not furnish board, but there is a large number of suitable private places in Urbana and Champaign, within walking distance of the University, and easily accessible by electric railway, where students can obtain table board and rooms. There are several students' clubs at which the cost of meals is about two and a half dollars a week.

The Business Manager and the Young Men's and Young Women's Christian Associations of the University will aid new students in procuring rooms and boarding places.

FEES

The TUITION IS FREE in all the University classes for matriculated students.

THE MATRICULATION FEE entitles the student to membership in the University until he completes his studies, and is........$10 00

THE DIPLOMA FEE, payable before graduation, is................ 5 00

THE TERM FEE, for incidental expenses, is, for each student, except in Graduate School.................................. 7 50

THE TUITION FEE, for all special students (except in music), and for pupils of the Preparatory School, per term. is........... 5 00

MUSIC FEES.—Students enrolled in the department of music only, pay no matriculation fee or term fee. They must, however, pay the following music fees:

	FIRST TERM	SECOND TERM	THIRD TERM
Piano, Organ, or Voice (Two lessons a week.)	$25 00	$20 00	$20 00
Piano, Organ, or Voice (One lesson a week.)	15 00	12 00	12 00
Violin or other stringed instrument (Two lessons a week.)	21 00	16 00	16 00
Violin or other stringed instrument (One lesson a week.)	11 00	9 00	9 00

Harmony, counterpoint, fugue, etc., in classes not to exceed four, $10.00 per term.

Students enrolled in any one of the colleges, who have paid the fees therein, may enter the department of music on payment of the following fees:

	FIRST TERM	SECOND TERM	THIRD TERM
Piano, Organ, or Voice............ (Two lessons a week.)	$20 00	$15 00	$15 00
Piano, Organ, or Voice............ (One lesson a week.)	12 00	9 00	9 00
Violin or other stringed instrument. (Two lessons a week.)	16 00	11 00	11 00
Violin or other stringed instrument. (One lesson a week.)	9 00	6 00	6 00

No deduction is made on account of absence in any course, except in case of protracted illness.

Students can rent pianos for practice by applying to the head of the music department.

LABORATORY FEES.—Each student working in laboratories, or in the drafting or engineering classes, is required to make a deposit varying from 50 cents to $10, to pay for chemicals and apparatus used, and for any breakages or damages.

ALL BILLS due the University *must be paid within ten days after the student enters classes.*

NECESSARY EXPENSES

The following are estimated minimum and maximum annual expenses, exclusive of books, clothing, railroad fare, laboratory fees, if any, and small miscellaneous needs:

Term fees..	$22 50	$ 22 50
Room rent for each student (two in a room)..........	22 50	50 00
Table board in boarding houses and clubs............	90 00	126 00
Fuel and light....................................	10 00	15 00
Washing..	12 00	18 00
Total..	$157 00	$231 50
Board and room in private houses, per week........	4 00	6 00

CAUTION TO PARENTS—STUDENTS' FUNDS

The Business Manager will receive on deposit any funds parents may intrust to him to meet the expenses of their sons and daughters. *No greater error can be committed than to send young people from home with large amounts of spending money,* without the authoritative care of some prudent friend. Half the dissipation in colleges springs from excessive allowances of money.

PREPARATORY SCHOOL

INSTRUCTORS

EDWARD G. HOWE, *Principal,* Natural Science.
HERMAN S PIATT, A.M., French.
NATHAN A. WESTON, B.L., History and Geometry.
RALPH P. SMITH, Ph.B., German.
LILLIE ADELLE CLENDENIN, English.
CHARLES N. COLE, A.B., Latin and Greek.
REUBEN S DOUGLASS, A.B., Algebra.
GEORGE D. HUBBARD, B.S., Science.

This school has an efficient corps of instructors and ample equipment for thorough work along those lines which will best prepare the student for the University. The school offers special advantages to young men and women who, on account of advanced age or prolonged absence from school, are out of touch with the high school.

ADMISSION

Candidates for admission must be at least fifteen years of age, and must pass satisfactory examinations in the following subjects:

1. ARITHMETIC.—A thorough knowledge is required of fundamental operations, simple and denominate numbers, the metric system of weights and measures, common and decimal fractions, practical measurements, percentage, ratio and proportion.

2. ENGLISH.—The examination is intended to test the student's vocabulary, and his knowledge of grammar.

3. GEOGRAPHY.—An accurate knowledge of elementary physical and political geography is required.

4. HISTORY.—As a foundation in this subject, a knowledge

of the early settlement of North America and of the growth and development of the United States, is required. A knowledge of the nature and operation of the forces active in American life is desired, rather than the memorization of isolated dates and names.

Entrance should be made at the opening of the term. Examinations are held in the rooms of the school. For the fall term, 1897, these examinations occur on Thursday, Friday, and Saturday, the 2d, 3d, and 4th of September; for the winter and spring terms, on the two days previous to the opening of each term. Examinations on these dates are free, but for examinations at other times a fee of three dollars is charged.

Examinations may be conducted in Illinois by county superintendents of schools in the same manner as for teachers' certificates, and their favorable reports will be accepted for entrance. First or second grade teachers' certificates from superintendents of Illinois will be taken for the same purpose.

On the written recommendation of their principals, students from the accredited schools of the University may be admitted without entrance examinations and credit will be allowed for all equivalent work already done. Blanks for such recommendations will be sent on application.

COURSE OF STUDY

The time necessary for the completion of the course offered is not fixed, but depends on the ability and previous training of the student. Applicants will be admitted at any time on presenting proof that they are prepared to pursue the selected subjects. Preparatory students generally carry four studies, one of which should be such as needs but little work outside of the class room. The number varies, however, with the ability of the student and the nature of the course.

SUBJECTS OFFERED*

Fall Term.	*Winter Term.*	*Spring Term.*
Drawing	Drawing	Drawing
History	History	History

*Details of work can be found in the courses of instruction, p. 225.

Language

English	English	English
French	French	French
Greek	Greek	Greek
German	German	German
Latin	Latin	Latin
	Mathematics	
Algebra	Algebra	Algebra
Geometry	Geometry	Geometry
	Science	
Zoölogy	Physiology	Botany
	Physics	Physics

Students must choose from the above list such studies as they require for their chosen courses in the University, taking those under each head in the order given, except the optional languages and sciences.

COURSES OF INSTRUCTION

ALGEBRA

Rapidity and accuracy in all operations is rigidly required. Special emphasis is laid upon the use of purely literal expressions, radicals, fractional and negative exponents, and upon the fundamental nature of the equation.

By terms, the work is divided as follows:

1. Fundamental processes, factoring, divisors, and multiples, fractions, and simple equations with one or more unknown quantities.

2. Involution and evolution, theory of exponents, radicals, and quadratic equations.

3. Theory of quadratic equations, inequalities, theory of limits, ratio and proportion, variation and the progressions.

One class will review the entire subject in the fall term. If *five or more apply*, a beginning class will be formed in January.

BOTANY

This is a study of plants rather than of books about plants, although books are not disregarded. It is an introduction to the science, and is intended to give an acquaintance with the chief features of the subject. The analysis of simple flowers and the preparation of a small herbarium of correctly named and properly mounted plants is required.

ENGLISH

The subject is presented in such a way as to increase the student's vocabulary and to develop elegance and exactness of expression in his

composition. Advanced grammar and rhetoric are taught in connection with this work. The study of literary masterpieces is also pursued to furnish material for the weekly written exercises, and to cultivate a taste for good literature. Considerable collateral reading in English and American authors is therefore required.

The work, by terms, is as follows:

First Year

1. Review of Grammar. Composition. Critical study of English and American Masterpieces.

2. Genung's Outlines of Rhetoric. Composition. Critical study of English and American Masterpieces.

3. Genung's Outlines of Rhetoric completed. Composition. Critical study of English and American Masterpieces.

Second Year

All three terms.—A general survey of American Literature. Theme writing. Critical study of English and American Masterpieces.

A course of outside reading runs through the two years.

FREE-HAND DRAWING

This subject is best taken in the first term in order that pupils may have the benefit of its training in the studies which follow. *Frederick's Notes on Free-Hand Drawing.*

FRENCH AND GERMAN

Students in the Preparatory Department take the first year's work of the regular University German and French classes. The *Joynes-Meissner German Grammar* and *Van Daell's Beginning French*, together with short stories and sketches of varying difficulty, form the basis of this work.

GEOMETRY

Special attention is paid to the development of the idea of mathematical demonstration; and, as many students who can reason logically cannot express their ideas clearly, due attention is paid to correctness of form. As soon as the student has attained the art of rigorous demonstration he is required to produce constructions and demonstrations for himself. Considerable attention is devoted to original work.

The work, by terms, is as follows:

1. All of Plane or Solid* Geometry.
2. Both Plane* and Solid Geometry.
3. Solid Geometry.

*If five or more apply.

GREEK

The study of this subject should, when possible, be preceded by at least one year of Latin.

The work, by terms, is arranged as follows:

First Year

1. Goodwin's Greek Grammar with Preparatory Greek Book.
2. Goodwin's Greek Grammar, and Moss's First Greek Reader.
3. The Grammar and Xenophon's Anabasis with Greek prose composition.

Second Year

1. Continuation of third term's work.
2. The Grammar and selections from Xenophon's Hellenica with prose composition based on the text read.
3. The Grammar and selections from Herodotus with prose composition based on the text read.

The authors named in the last four terms will not be insisted upon in the case of those offering Greek for entrance. An equivalent amount from any other authors will be accepted. Ability to read at sight passages of average difficulty will be deemed of major importance.

HISTORY

Instruction in this subject is confined to English and American history. A detailed study of the rise and progress of the English-speaking people in England and America is made, and considerable attention is given to the origin and development of representative government. The work extends through one year; one-half of the time is devoted to English, and the other half to American history.

The work, by terms, is as follows:

1. English History through the Revolution of 1688.
2. English History from 1688 to the present time, and American History to the Revolutionary War.
3. American History from the Revolutionary War to the present time.

LATIN

The ground covered consists of the grammar and selections from Cæsar, Sallust, Cicero, and Vergil. Translation of English into Latin is made a prominent part of the work, and in connection with the Vergil the scansion of hexameter verse and matters of historical and mythological interest are studied. The Roman method of pronunciation is used, with special attention to quantity. *Allen and Greenough's Grammar, and Collar's Prose Composition.*

By years, the work is as follows:

First Year

Preparatory Latin Book, Viri Romae, Arrowsmith and Whicher's Latin Readings.

Second Year

Cæsar, Sallust, Cicero

Third Year

Cicero, Vergil.

PHYSICS

This study is so presented as to cultivate habits of careful observation, and to develop in the student the ability to reach general conclusions inductively by means of exact experiment. In all laboratory work the student is required to keep a notebook containing a complete record of experiments performed. The work is begun in the winter term.

PHYSIOLOGY

In this subject the book used is illustrated by the use of charts, skeleton, and manikin, and by a series of laboratory experiments.

ZOÖLOGY

Through the study of typical animals the subject is so presented as to lead the student to a knowledge of methods of scientific classification in the natural sciences, and to prepare for the more advanced work of the University.

REGULATIONS

Reports regarding all non-resident and minor students (and, upon request, regarding any others) are sent to parents or guardians as soon as students are settled in their work, and reports regarding all students are sent at the close of each term.

The calendar of the Preparatory School is the same as that of the University.

For information concerning fees and expenses, see page 221.

For special information with regard to the Preparatory School, address Edward G. Howe, Urbana, Illinois.

LIST OF STUDENTS

*GRADUATE SCHOOL

Ammerman, Charles, A.B., DePauw Univ., *Green Castle, Ind.*, Pedagogy, Botany and History.

†Barclay, Thomas, B.S., Univ. of Ill., *Aurora*, Smelting and Refining Processes, U. S.; Geology of Ore Deposits.

†Boggs, Pearl, A.B., Univ. of Ill., *Paxton*, Greek and Sociology.

†Busey, Frank Lyman, B.S., Univ. of Ill., *Urbana*, Mechanical Engineering.

Campbell, Walter Gilbert, B.S., Fellow, Univ. of Ill., *Champaign*, Electrical Engineering.

Carnahan, David Hobart, A.B., Univ. of Ill., *Champaign*, French.

Clark, Thomas Arkle, B.L., Univ. of Ill., *Champaign*, French and English Literature.

Cole, Charles Nelson, A.B., Illinois Wesleyan Univ., *Champaign*, Latin, Greek, and Philosophy.

Cole, Mary Maude, A.B., Fellow, Univ. of Ill., *Rantoul*, Rhetoric and French.

Douglass, Reuben S., A.B., Marietta Coll.' *Champaign*, Mathematics.

Foote, Ferdinand John, B.S., Univ. of Ill. *Champaign*, Electrical Engineering

Fraser, Wilber John, B.S., Univ. of Ill., *Champaign*, Agriculture.

†Frederick, Grant, B.L., Univ. of Ill., *St. Lawrence, S. Dak.*, Economics.

†Funston, Jesse Grant, B.S., Univ. of Ill., *Champaign*, Electrical Engineering.

Garnett, Charles Hunter, A.B., Fellow, Univ. of Ill., *St. Mary*, Economics and History.

Goodenough, George Alfred, B.S., Michigan Agricultural Coll. *Champaign*, Mechanical Engineering.

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*Each student of the Graduate School is a candidate for a Master's or a Doctor's degree.

†*In absentia*.

Hall, Emery Stanford, B.S., Univ. of Ill., *Urbana*, Architecture.

*Hallinen, Joseph Edward, B.S., Univ. of Ill., *Ottawa*, Zoölogy and Pedagogy.

*Hempel, Adolph, B.S., Univ. of Ill., *Gotha, Fla.*, Protozoa and Rotifera; Literarture of Biological Station Methods and Investigations.

*Honens, Fred William, B.S., Univ. of Ill., *Milan*, Civil Engineering.

Hoover, Calvin Snyder, A.M., Indiana Univ., *Garfield, Pa.*, History, Sociology, and Pedagogy.

Hubbard, George David, B.S., Fellow, Univ. of Ill., *Urbana*, Paleontology, Zoölogy, and Entomology.

Jones, Mabel, B.L., Univ. of Ill., *Champaign*, English Literature and History of Architecture.

Ketchum, Milo Smith, B.S., Univ. of Ill., *Champaign*, Civil Engineering.

Leal, Sophie Nott, A B., Univ. of Ill., *Urbana*, Latin, German, and Pedagogy.

Ludwick, George Washington, B.S., Univ. of Ill., *Champaign*, Architecture.

McKee, James Harry, B.S., Fellow, Univ. of Ill., *Chicago* Mechanical Engineering.

*Martin, John Madison, A. B., Univ. of Ill., *Sullivan*, Pedagogy, Sociology, and Psychology.

Milne, Edward Lawrence, M.S., Fellow, Univ. of Ill., *Orange, N. J.*, Mathematics and Astronomy.

Mosier, Jeremiah George, B.S., Univ. of Ill., *Urbana*, Geology and Mineralogy.

*Parminter, Grace Etta, B.L., Univ. of Ill., *Metamora*, English Literature, Philosophy, and Pedagogy.

Patterson, Arthur Sales, Ph.B., Oberlin Coll., *Urbana*, French and German.

Reeley, Thomas Washington, B.S., Univ. of Ill., *Spring Green, Wis.*, Architecture.

*Richart, Frederick William, B.S., Univ. of Ill., *Carbondale*, Mechanical Engineering.

Sager, Fred Anson, B.S., Univ. of Mich., *Urbana*, Physics and Mathematics.

Sample, John C, B.S., Univ. of Ill., *Lebanon, Ia.*, Architecture.

Scoggan, Edward Barker, A.B., Amity Coll., *College Springs, Ia.*, Greek and German.

Sharpe, Richard W, B.S., Univ. of Ill., *Tiskilwa*, Systematic Invertebrate Zoölogy; General Zoölogy; Pedagogy of Science.

**In absentia.*

Spangler, John Nathaniel, A.B., Indiana University, *Rockville, Ind.*, Pedagogy, History, and Philosophy.

*Sy, Albert Philip, B.S., Univ. of Ill., *Buffalo, N. Y.*, Chemistry.

*Thompson, Almon Daniel, B.S. in Civil Engineering, Univ. of Ill., *Peoria*, Sewerage and Water Supply Engineering.

Weston, Nathan Austin, B.L., Univ. of Ill., *Champaign*, Economics.

†RESIDENT GRADUATES

Alden, Frederick Stanton, B.S. Cornell Coll., Ia., *Mt. Vernon, Ia.*, Civil Engineering.

Besore, Nellie, A. B., Univ. of Ill., *Urbana*, Latin.

Bowsher, Columbus Austin, Certificate, Univ. of Ill., *Urbana*, Physiology.

Brenke, William Charles, B.S., Univ. of Ill., *Urbana*, Mathematics and Astronomy.

Burt, Charles Ward, B.S., Drake Univ., *Valley Junction, Ia.*, Natural Science.

Clark, Mrs. Alice Broaddus, B.S., Univ. of Ill., *Champaign*, French.

Durstine, Warren Edward, B.S., Univ. of Ill., *Rock Falls*, Philosophy.

French, Ransford Morton, B.S., Univ. of Ill., *Chicago*, Civil Engineering.

Grubbs, Edwin Chester, B.S., Lenox Coll., Ia., *Urbana*, Architecture.

Jack, Francis Joseph, A.B., Leland Stanford, Jr. Univ., *Decatur*, Entomology.

McCormack, Harry, B.S., Drake Univ., *Des Moines, Ia.*, Chemistry.

Otto, Albert Sidney, B.S., Knox Coll., *Canton*, Natural Science.

Perry, Joseph Albert, U. S. Naval Academy, *Cornell*, Civil Engineering.

Van Orstrand, Charles Edwin, B.S., Univ. of Ill., *Pekin*, Mathematics and Astronomy.

Woolsey, Marion, A.B., Lake Forest Univ., *Galesburg*, Civil Engineering.

SENIORS

[In the lists which follow "L. and A." stands for College of Literature and Arts; "S." for College of Science.

Anderson, George Forbes,	*Carbondale*,	Civil Engineering.
Armstrong, James Ellis,	*Bondville*,	General, L. and A.
Barr, George Andrew,	*Wilton Center*,	Political Science.
Beadle, Thomas B,	*Kewanee*,	Chemistry.

**In absentia.*

†Students in this list are not candidates for higher degrees than they now hold.

Beal, Alvin Casey,	*Mt. Vernon,*	Agriculture.
Beebe, Charles David,	*Evanston,*	Mechanical Eng'g.
Borden, Gideon S ,	*Sugar Valley, Ohio*	Civil Eng'g.
Brandt, Eugene Hermann,	*Appleton City, Mo.,*	Architecture.
Braucher, Ralph Waldo,	*Lincoln,*	Agriculture.
Brower, Lyle Ireneus,	*Champaign,*	Architecture.
Brower, Ralph Plumb,	*Champaign,*	Civil Engineering.
Brown, Walter Burrows,	*Rock Falls,*	Chemistry.
Buck, Luella Eugenia,	*Philo,*	Natural Science.
Capron, Frank Read,	*Carthage,*	Architecture.
Carpenter, Hubert Vinton,	*Argo,*	Electrical Engineering.
Chester, Manley Earle,	*Champaign,*	Electrical Eng'g.
Clark, Charles Richard,	*Urbana,*	Architecture.
Clarke, Octave Besançon,	*Quincy,*	Electrical Engineering.
Coffeen, Harry Clay,	*Champaign,*	Math. and Ast., L. & A.
Crellin, Charles Virgil,	*Winfield, Ia.,*	Electrical Eng'g.
Dewey, James Ansel,	*Urbana,*	Natural Science.
Dewey, Louise Sarah,	*Urbana,*	Natural Science.
Dull, William Raymond,	*Burlington, Kas.,*	Mech. Eng'g.
Dunlap, Elmer Edgar,	*Columbus, Ind.,*	Architecture.
Fergus, William Loveday.	*Chicago,*	Mechanical Engineering.
Forbes, Ernest Browning,	*Urbana,*	Natural Science.
Frees, Herman Edward,	*Chicago,*	Chemistry.
Garber, John Franklin,	*Flora,*	General, L. and A.
Gayman, Bert A,	*Champaign,*	Mechanical Eng'g.
Gearhart, Orval Lee,	*Farmer City,*	Architectural Eng'g.
Grimes, George Lyman,	*Moline,*	Mechanical Eng'g.
Gulick, Clyde Denny,	*Champaign,*	Natural Science.
Hadsall, Harry Hugh,	*Wilmington,*	Civil Engineering.
Havard, Oliver David,	*Urbana,*	Electrical Eng'g.
Hobart, Albert Claude,	*Elgin,*	Civil Engineering.
Hopper, Georgia Etherton,	*Champaign,*	General, L. and A.
Horn, Carl John,	*Naperville,*	Architecture.
Howison, Charles,	*Sandwich,*	Architecture.
Hughes, Frank Alexis,	*Pueblo, Colo.,*	Civil Engineering.
Ice, Marinda,	*Gifford,*	Eng. and Mod. Lang.
Ice, Meldora,	*Gifford,*	Architecture.
Jobst, George J,	*Peoria,*	Architectural Eng'g.
Kerns, Shirley Kendrick,	*Champaign,*	General, L. and A.
Kiler, William Henry,	*Urbana,*	General, L. and A.
Kirkpatrick, Harold H,	*Mayview,*	General, L. and A,

Kistner, Theodore Charles,	*Carlinville,*	Architecture.
Klossowski, Theodore Julius,	*Dixon,*	Civil Engineering
Kratz, Laura,	*Monticello,*	General, L. and A.
Kuehne, Carl Oscar,	*Chicago,*	Architecture.
Larson, Charles Sigurd,	*Chicago,*	Electrical Eng'g.
Leigh, Charles Wilbur,	*Wyoming,*	Math. and Ast., S.
McFadden, Belle Lorraine,	*Champaign,*	General, L. and A.
McGilvrey, Mrs. Mary,	*Urbana,*	General, L. and A.
Mann, Arthur Richard,	*Mannville, Fla.,*	Mechanical Eng'g.
Manny Fred Hugh,	*Urbana,*	Natural Science.
Marsh, Loren William,	*Joliet,*	Electrical Eng'g.
Marsh, Norman Foote,	*Upper Alton,*	Architecture.
Millar, Adam Vause,	*Mattoon,*	Math. and Ast,, S.
Morgan, Walter Montgomery,	*Kinmundy,*	General, L. and A.
Munhall, Grace May,	*Champaign,*	General, L. and A.
Murphy, Francis Joseph,	*Long Grove, Ia.,*	Chemistry.
Musham, John William,	*Chicago,*	Civil Engineering.
Nelson, Fred Irwin,	*Buda,*	Mechanical Eng'g.
Nye, Carl Merriman,	*Moline,*	Municipal and San. Eng'g.
Parr, John Louis,	*Wyoming, Wis.,*	Architecture.
Paul, Arthur Ernest,	*Chicago,*	Chemistry.
Pepper, William Allen,	*Joliet,*	Electrical Eng'g.
Pitney, Clarence Orville,	*Augusta*	Natural Science.
Plym, Francis John,	*Aledo,*	Architecture.
Pohlman, John Edward,	*Joliet,*	Civil Engineering.
Poole, Edward Warren,	*Dover,*	Electrical Eng'g.
Porter, Horace Chamberlain,	*Champaign,*	General, L. and A.
Postlethwaite, Francis William Henry,	*Toronto, Can.,*	Electrical Eng'g.
Randall, Dwight T,	*Augusta, Mich.,*	Mech. Eng'g.
Rayburn, Charles Clyde,	*Roseville,*	Chemistry.
Rheinlander, Albert William,	*Evansville, Ind.,*	Electrical Eng'g.
Sammis, John Langley,	*Jacksonville,*	Chemistry.
Sayers, William Wesley,	*Champaign,*	Mechanical Eng'g.
Sayler, Joel Reynolds,	*Yuba, Mich.,*	Mechanical Eng'g
Schacht, Frederick William,	*Moline,*	Natural Science.
Shepardson, Ralph Steele,	*Aurora,*	Architecture.
Smith, Louie Henrie,	*Crystal Lake,*	Chemistry.
Spencer, Fred Wilcox,	*Clinton, Ia.,*	Architectural Eng'g.
States, William Daniel.	*Elwood,*	Mechanical Eng'g.
Steinwedell, George Otto	*Quincy,*	Electrical Eng'g.
Teeple, Wallace Douglas,	*Marengo,*	Architecture.

Terry, Charles Dutton,	*Kewanee*,	Mechanical Eng'g.
Thompson, Susan Elizabeth,	*Bement*,	General, L. and A.
Vail, Walter Cheney,	*Kewanee*,	Architecture.
Vigal, William Myron,	*Edinburg*,	Civil Engineering.
de Vries, Steven George,	*Pekin*,	Electrical Eng'g.
Wakefield, George Mighell,	*Waterman*,	Electrical Eng'g.
Wallace, Herbert Milford,	*Chicago*,	Eng. and Mod. Lang.
Webber, Hubert Anthony,	*Mt. Vernon*,	Architecture.
Whittemore, Floyd,	*Sycamore*,	Electrical Eng'g.
Winter, Julia Flora,	*Tryon, N. C.*,	General, L. and A.
Young, Charles Whittier,	*Chicago*,	Natural Science.
Zilly, Mabel Helen,	*Champaign*,	General, L. and A.
Zimmerman, Walter,	*Champaign*,	Mechanical Eng'g.

JUNIORS

Aaron, Philip Judy,	*Big Neck*,	Electrical Eng'g.
Anderson, Clark Godfrey,	*Moline*,	Civil Engineering.
Arnold, Jay Jennings,	*Springfield*,	Natural Science.
Beasley, D Edythe,	*Urbana*,	Classical
Beem, Fred Clarkson,	*Ottawa*,	Architecture.
Black, William Wesley,	*Champaign*,	Philosophy, L and A.
Boggs, Oliver Carter,	*Urbana*,	General, L. and A.
Breidert, Henry, Cyrille,	*Havana*,	Civil Engineering.
Brockway, Edwin Ladue,	*Macomb*,	Electrical Eng'g.
Burkland, Theodore Leonard,	*Moline*,	Civil Engineering.
Campbell, Maude Permill,	*Champaign*,	Art and Design.
Carson, Lucy Hamilton,	*Champaign*,	Eng. and Mod. Lang.
Chester, Guy Jacob,	*Champaign*,	Electrical Eng'g.
Clark, Charles Albert,	*Vandalia*,	Electrical Eng'g.
Clayton, Thomas Wiley,	*Dixon*,	Civil Eng'g.
Collins, Edgar Francis,	*Champaign*,	Electrical Eng'g.
Corbus, Burton Robison,	*LaSalle*,	Natural Science.
Craig, Wallace,	*Chicago*,	Natural Science.
Crathorne, Arthur R,	*Champaign*,	Math., Ast., L. and A.
Davison, Chester Morton,	*Rock Falls*,	Architecture.
Dickey, James Harvey,	*Urbana*,	Math. and Phys., 8.
Dillon, William Wagner,	*Sheldon*,	Political Science.
Du Bois, Atexander Dawes,	*Springfield*,	Electrical Eng'g.
Dunkin, William Van,	*Urbana*,	Math. and Ast., S.
Eckles, Harry Edward,	*New Castle, Pa.*,	Civil Eng'g.
Enochs, Claude Douglass,	*Champaign*,	Electrical Eng'g.

Enochs, Delbert Riner,	*Champaign,*	General, L. and A.
Everhart, Rollin Orlando,	*Carlinville,*	General, L. and A.
Fischer, Louis Englemann,	*Shiloh,*	Municipal Eng'g.
Forbes, Stewart Falconer,	*Urbana,*	Architecture.
Fullenwider, Arthur Edwin,	*Mechanicsburg,*	Architecture.
Fulton, William John,	*Hartford City, Ind.,*	Gen'l, L. & A.
Gerber, Winfred Dean,	*Rockford,*	Civil Engineering.
Goodridge, Henry Anthony,	*Chicago,*	Electrical Eng'g.
Graham, George Woods,	*Freeport,*	Civil Engineering.
Greene, Mary Avery,	*Champaign,*	General, L. and A.
Hair, Charles Ernest,	*Galesburg,*	Architecture.
Hammers, Morgan J,	*Champaign,*	Mechanical Eng'g.
Hatch, Thomas Milford,	*Goshen, Ind.,*	Electrical Eng'g.
Hays, Don,	*Sidney,*	Civil Engineering.
Hill, Irwyn Horatio,	*Joliet,*	Architecture.
Hotchkiss, Robert James,	*Peoria,*	Architecture.
House, Leone Pearl,	*Sadorus,*	General, L. and A.
Hughes, Arlington H,	*Mattoon,*	General, L. and A.
Hurd, Arthur Burton,	*El Paso,*	Electrical Eng'g.
Jordan, Helen,	*Tolono,*	General, L. and A.
King, Wesley Edward,	*Champaign,*	General, L. and A.
Knorr, Carl Wolfsohn,	*Chicago,*	Electrical Eng'g,
Koch, Fritz Conrad,	*Elmhurst,*	Chemistry.
Kyle, Martha Jackson,	*Urbana,*	General, L. and A.
Lentz, Caroline,	*Arcola,*	Classical.
Linn, Francis David,	*Byron,*	Agriculture.
Linzee, Albert Carl,	*Du Quoin,*	Electrical Eng'g.
McCarty, Charles James,	*Lombardville,*	Electrical Eng'g.
Marshutz, Joseph Hunter,	*Champaign,*	General, L. and A.
May, Harry Monroe,	*Rochelle,*	Electrical Eng'g.
Merker, Henry Fleury,	*Belleville,*	Electrical Eng'g.
Mesiroff, Josef,	*Chicago,*	Electrical Eng'g.
Mitchell, Frederick Alexander,	*Hillsboro,*	Mechanical Eng'g.
Naper, Herbert John,	*Chicago,*	Architectural Eng'g.
Neureuther, Andrew Henry,	*Peru,*	Mechanical Eng'g.
Nevins, John,	*Camp Point,*	Architecture.
Nickoley, Edward Frederick,	*Long Grove,*	Eng. and Mod. Lang.
von Oven, Frederick William,	*Naperville,*	Civil Engineering.
Paul, Elmer Christian,	*Peoria,*	Chemistry.
Pease, Henry Mark,	*Malta,*	Electrical Eng'g.
Perkins, Reed Miles,	*Springfield,*	General, L. and A.

Pierce, William Thomas,	*Mt. Carroll,*	Civil Engineering.
Polk, Cicero Justice,	*Arcola,*	General, L. and A.
Pooley, William Vipond,	*Galena,*	General, L. and A.
Ray, George Joseph,	*El Paso,*	Civil Engineering.
Rhodes, Ora M,	*Bloomington,*	Natural Science.
Robinson, Lewis Archibald,	*White Post, Va.,*	Natural Science.
Ross, Herbert Austin,	*Jerseyville,*	Architectural Eng'g.
Saunders, Rome Clark,	*Champaign,*	Electrical Eng'g.
Schneiter, Samuel,	*Paxton,*	General, L. and A.
Smith, Elmer Church,	*Columbus, Neb.,*	Civil Engineering.
Soper, Stanley Livingston,	*Garrison,*	Eng. and Mod. Lang.
Staley, Joseph Clarence,	*Urbana,*	General, L. and A.
Stone, Albert James,	*Quincy,*	Mechanical Eng'g.
Stoolman, Almond Winfield Scott,	*Champaign;*	Natural Science.
Thayer, Albert Lewis,	*New Castle, Pa.,*	Architecture.
Thompson, Guy Andrew,	*Steward,*	General, L. and A.
Toenniges, Ferdinand Fred'k Emil,	*Davenport, Ia.,*	Civil Engineering.
Unzicker, William Luther,	*Hopedale,*	Classical.
Van Meter, Seymour,	*Cantrall,*	Architecture.
Walker, Rufus, Jr ,	*Moline,*	General, L. and A.
Walter, Charles Albert,	*Sandwich,*	Chemistry.
Webster, Joshua Percy,	*Philadelphia, Pa.,*	Civil Engineering.
Webster, Sarah Emeline,	*Champaign,*	General, L. and A.
Weirick, Ralph Wilson,	*Washington,*	Architecture.
Wetzel, Clyde Leigh,	*Traer, Ia.,*	Electrical Eng'g.
Wharf, Allison James,	*Olney,*	Civil Engineering.
Williamson, Albert St. John,	*Quincy,*	Mechanical Eng'g.
Wilson, Frederick Henry,	*Evanston,*	Electrical Eng'g.
Wingard, Lewis Forney,	*Champaign,*	General, L. and A.
Wolcott, James Thompson,	*Peoria,*	Chemistry.
Woodworth, Minnie Barney,	*Champaign,*	General, L. and A.
Wuerffel, Herman Louis,	*Chicago,*	Electrical Eng'g.
Young, John Hayes,	*Chicago,*	Electrical Eng'g.

SOPHOMORES

Adolph, Peter,	*San Jose,*	Mechanical Eng'g.
Anderson, Harry,	*Sheldon,*	Electrical Eng'g.
Armstrong, Cecil Everett,	*Champaign,*	Chemistry.
Armstrong, Frank Hall,	*Serena,*	Mechanical Eng'g.
Arps, George Frederick,	*Carey,*	Natural Science.
Beach, Wilfred Warren,	*Sioux City, Ia.,*	Architecture.

Beatty, John Wirts,	*Delavan*,	General, L. and A.
Beckerleg, Gwavas Foster,	*Chicago*,	Civil Engineering.
Bennett, Ralph,	*Chicago*,	Electrical Eng'g.
Bennett, Ruth,	*Chicago*,	General, L. and A.
Berry, Erwin Howard,	*Paw Paw*,	Chemistry.
Biebinger, Isaac Newton,	*Milmine*,	Natural Science.
Bigelow, Mary C,	*Champaign*,	Math., Ast., L. and A.
Bonser, Frederick Gordon,	*Pana*,	Natural Science.
Bradley, James Clifford,	*Morrison*,	Mechanical Eng'g.
Branch, Elizabeth,	*Champaign*,	Natural Science.
Branch, James McKenne,	*Champaign*,	Architectural Eng'g.
Browder, Carrie Tweed,	*Edgar*,	General, L. and A.
Brown, Arthur Artemas,	*Urbana*,	Mechanical Eng'g.
Burroughs, Elmer,	*Savoy*,	Electrical Eng'g.
Busey, Laura,	*Urbana*,	General, L. and A.
Busey, Robert Oscar,	*Urbana*,	General, L. and A.
Byrne, Lee,	*Marshall, Minn.*,	Classical.
Capron, Clyde,	*Marion*,	Political Science.
Carter, Henry Leslie,	*Girard*,	Math. and Physics, S.
Chipps, Halbert Lilly,	*Sullivan*,	Civil Engineering.
Church, Frank Wilson,	*Chicago*,	Architecture.
Chuse, Harry Arthur,	*Mattoon*,	Mechanical Eng'g.
Clark, Edith,	*Vandalia*,	General, L. and A.
Clark, Mary Edith,	*Urbana*,	General, L. and A.
Clark, Philip Henry,	*Galena*,	General, L. and A.
Clifford, Charles Luther,	*Serena*,	Electrical Eng'g.
Coad, Robert Ewing,	*Livermore, Pa.*,	Math. and Ast., S.
Cooper, Edgar Cook,	*Mendota*,	Municipal Eng'g.
Dill, William,	*Little Rock, Ark.*,	Architecture.
Dillon, Roy Hodgson,	*Normal*,	Electrical Eng'g.
Dinwiddie, Virginia,	*Champaign*,	Natural Science.
Dodds, George,	*Neoga*,	Electrical Eng'g.
Dougherty, Andrew Jackson,	*Mound City*,	Electrical Eng'g.
Eastman, Harry,	*Rock Island*,	Architecture.
Ely, Howard Montgomery,	*Peoria*,	Mechanical Eng'g.
Fairclo, George Cassius,	*Sycamore*,	Electrical Eng'g.
Fisher, Jacob G,	*Indianola*,	Chemistry.
Fithian, Sidney Breese,	*Newton*,	General, L. and A.
Fleager, Clarence Earl,	*Sheldon*,	Electrical Eng'g.
Flesch, Eugene William Penn,	*Chicago*,	Architectural Eng'g.
Foberg, John Albert,	*Beardstown*,	Math. and Phys., S.

Forden, James Russell,	*Springfield*,	Mechanical Eng'g.
Fowler, Robert Lambert,	*Charity*,	Civil Engineering.
Fox, Fred Gates,	*Peru*,	General, L. and A.
Fraser, William Alexander,	*LaSalle*,	Mechanical Eng'g.
Frazey, Alice Belle,	*Urbana*,	General, L. and A.
Garver, Daisy,	*Bloomington*,	Classical.
Gilchrist, Hugh McWhurr,	*Gilchrist*,	Electrical Eng'g.
Ginzel, Rollin Francis,	*Trenton*,	Architecture.
Graham, Archie James,	*Gallipolis, Ohio*,	Natural Science.
Graham, Hugh Joseph,	*Springfield*,	General, L. and A.
Griffin, Walter B,	*Elmhurst*,	Architectural Eng'g.
Griffith, George John,	*Savanna*,	Eng. and Mod. Lang.
Grim, Fred,	*Canton*,	Civil Engineering.
Hall, Louis Dixon,	*Hawarden, Ia.*,	Mechanical Eng'g.
Harris, Borden Baker,	*Quincy*,	Civil Engineering.
Harrower, John Charles,	*Barrington*,	Mechanical Eng'g.
Haseltine, Warren Edmund,	*Aurora*,	Chemistry.
Hatton, Edward Howard,	*Peru*,	Philosophy, S.
Hawley, William Albert,	*Dundee*,	Civil Engineering.
Hazlitt, Albert Nichols,	*Ottawa*,	Architecture.
Helton, Alfred Joseph,	*Atwood*,	General, L. and A.
Herwig, John Newton,	*Mason City*,	Mechanical Eng'g.
Hines, Edward George,	*Huey*,	Architecture.
Hoagland, John C,	*Sheldon*,	Natural Science.
Hoagland, John King,	*Herborn*,	Agriculture.
Hopkins, Milton Irwin,	*Indianapolis, Ind.*,	Elec. Eng'g.
Hubbard, George Wallace,	*Urbana*,	Mechanical Eng'g.
Hughston, Allie Dellena,	*Urbana*,	Natural Science.
Jackson, William John,	*Chicago*,	Civil Engineering.
James, Frederick Milton,	*Piasa*,	General, L. and A.
Johnson, Edwin Samuel,	*Sterling*,	Civil Engineering.
Jones, Louise,	*Champaign*,	General, L. and A.
Jutton, Emma Reed,	*Champaign*,	General. L. and A.
Kable, James Franklin,	*Virden*,	Architectural Eng'g.
Kaeser, Albert Fred,	*Highland*,	Natural Science.
Keener, Charles Edward,	*Chicago*,	Civil Engineering.
Kennard, Edward Morrison,	*Champaign*,	General, L. and A.
Ketchum, Daniel Clement,	*Champaign*,	General, L. and A.
Kirkpatrick, Asa Baird,	*Elmwood*,	Natural Science.
Kofoid, Nellie Ione,	*Normal*,	Natural Science.
Krahl, Benjamin Franklin,	*Aurora*,	Civil Engineering.

Lamet, Louis Harman,	*Warsaw,*	Civil Engineering.
Landel, Ida Susan,	*Paxton,*	Eng. and Mod. Lang.
Latzer, John Albert,	*Highland,*	Agriculture.
Lawrence, Carroll Gray,	*Carbondale,*	Architecture.
Leach, William Blake,	*McLean,*	General, L. and A.
Lee, Julian Liechaski,	*Memphis, Tenn.,*	Mechanical Eng'g.
Leutwiler, Oscar Adolph,	*Highland,*	Mechanical Eng'g.
Lindsay, Blanche,	*Onarga,*	General, L. and A.
Loftus, Ella,	*Champaign,*	General, L. and A.
Meharry, Jesse Erle,	*Tolono,*	General, L. and A.
Mercil, Benoni Edward,	*Chicago,*	Electrical Eng'g.
Merrill, Stillwell Frederick,	*Collinsville,*	Chemistry.
Mills, Ralph Walter,	*Webster Groves, Mo.,*	Nat. Science.
Miner, Fred Graham,	*Adair,*	Agriculture.
Mitchell, Edwin Whitford,	*Round Grove,*	Agriculture.
Morrow, Grace Eliot,	*Stillwater, Okla.,*	Nat. Science.
Munhall, Dola,	*Champaign,*	General, L. and A.
Newell, Mason Harder,	*Springfield,*	General, L. and A.
Niccolls, Calvin Barnes,	*New Lenox,*	Electrical Eng'g.
Omer, Lewis,	*Clayton,*	Electrical Eng'g,
Owbridge, Lionel Herbert,	*Springfield,*	Architecture.
Owens, Dasie Margaret,	*Urbana,*	Natural Science.
Owens, Wilkins Hoover,	*Champaign,*	Natural Science.
Oxer, George Carl,	*Macon,*	Electrical Eng'g.
Paul, Wesley Arthur,	*Peoria,*	Electrical Eng'g.
Phillips, Theodore Clifford,	*Mt. Carroll,*	Civil Engineering.
Pixley, Arthur Homer,	*Ingraham,*	General, L. and A.
Postel, Fred Jacob,	*Mascoutah,*	Electrical Eng'g.
Railsback, Roy J,	*Hopedale,*	Classical.
Ray, Walter Thornton,	*Metamora,*	General, L. and A.
Raymond, Ruth Cleveland,	*Sidney,*	General, L. and A.
Rhoads, Horace Adams,	*Champaign,*	General, L. and A.
Robinson, Phillip Sidney,	*Sharon, Vt.,*	Electrical Eng'g.
Rodgers, Leon L,	*Riverton,*	Civil Engineeering.
Rolfe, Martha Deette,	*Urbana,*	Natural Science.
Rudnick, Paul Frederick Augustus,	*Chicago,*	Chemistry.
Sears, Will Everett,	*Rock Island,*	Mechanical Eng'g.
Seely, Garrett Teller,	*Oswego,*	Civil Engineering.
Shamel, Archibald Dixon,	*Taylorville,*	Agriculture.
Sheean, Frank Thomas,	*Galena,*	General, L. and A.
Sheean, Henry David,	*Galena,*	General, L. and A.

Sheldon, Carl Edmunds,	*Sterling*,	General, L. and A.
Smith, Charles Augustus,	*Mattoon*,	Architecture.
Smith, Florence Mary,	*Urbana*,	General, L. and A.
Staley, Maggie Edith,	*Urbana*,	General, L. and A.
Summey, David Long,	*Athol Springs, N. Y.*,	Elect. Eng'g.
Taylor, Thomas Varence,	*Urbana*,	General, L. and A.
Tebbetts, George Edward,	*Chicago*,	Civil Engineering.
Temple, Harry Roberts,	*Elida*,	Architecture.
Theiss, Otto John,	*Sublette*,	Civil Engineering.
Uthoff, Herman Conrad,	*Peru*,	Philosophy, S.
Vial, Alice Mildred,	*Western Springs*,	General, L. & A.
Volk, Edmund,	*Mendota*,	Electrical Eng'g.
Waldo, Marie L,	*Champaign*,	Natural Science.
Walker, Herbert William,	*Dundee*,	Electrical Eng'g.
Weaver, Ben: Perley,	*Urbana*,	Natural Science.
Webster, William W,	*Urbana*,	Mechanical Eng'g.
Wernham, James Ingersoll,	*Marengo*,	Chemistry.
Whelpley, Cecilia,	*Cobden*,	Natural Science.
Whitmeyer, Mark Hubert,	*Danville*,	Architecture.
Willcox, Maurice Meacham,	*Elmore*,	Civil Engineering.
Wilmarth, George Henry,	*Aurora*,	Electrical Eng'g.
Wilson, Theron Campbell,	*Champaign*,	Political Science.
Woolsey, Lulu Catherine,	*Polo*,	Political Science.
Young, Bertram Otho,	*Le Roy*,	Political Science.

FRESHMEN

Allen, Frank Gilbert,	*Rock Island*,	Electrical Eng'g.
Appelquist, Jerome Gustav,	*Orion*,	Civil Engineering.
Applegate, Alpheus Miller,	*Atlanta*,	General, L. and A.
Armstrong, Emelie Edith,	*Champaign*,	General, L. and A.
Ballard, David Paige,	*Maywood*,	Electrical Eng'g.
Bardwell, Faith Leland,	*Champaign*,	General, L. and A.
Baxter, Charles Parker,	*Taylorville*,	Electrical Eng'g.
Baylor, Curtiss Ellsworth,	*Cuba*,	General, L. and A.
Bear, Katharyn W,	*Ludlow*,	Math. and Physics, S.
Berger, William Louis,	*Geneseo*,	Electrical Eng'g.
Bevans, Thomas Murray,	*Chicago*,	Electrical Eng'g.
Bird, Frederick Joel,	*Woodstock*,	Mechanical Eng'g.
Black, George McCall,	*Canton*,	Electrical Eng'g.
Borton, William Franklin,	*De Land*,	Mechanical Eng'g.

Boyd, Robert Sherman,	*Lewistown,*	General, L. and A.
Bracken, Ellis Freemen,	*Greenview,*	Electrical Eng'g.
Branch, Thomas Anderson,	*Champaign,*	Natural Science.
Brown, Ethel Mae,	*Chicago,*	General, L. and A.
Brown, William Jay,	*Urbana,*	Architectural Eng'g.
Bryant, Ralph Clement,	*Princeton,*	Natural Science.
Burke, Eugene,	*Champaign,*	General, L. and A.
Bush, John Kenyon,	*Joliet,*	General, L. and A.
Cabeen, Fred Earl,	*Aledo,*	Architecture.
Cabeen, Joshua Dale,	*Aledo,*	Electrical Eng'g.
Campbell, Ashton Ellsworth,	*Champaign,*	Political Science.
Carey, Will Gage,	*Rockford,*	General, L. and A.
Chapman, Charles Hiram,	*Vienna,*	Classical.
Chester, Mary,	*Champaign,*	Natural Science.
Church, Walter Samuel,	*Chicago,*	Architecture.
Clinton, Edgar Marcellus,	*Polo.*	Natural Science.
Coats, Alice Lynette,	*Coats Grove, Mich.,*	Nat. Science.
Coey, Robert Hill,	*Chicago,*	Architectural Eng'g.
Cooper, Fred Worth,	*Champaign,*	Natural Science.
Cottingham, Wm. Stillman Chapin,	*Lincoln,*	Mechanical Eng'g.
Curtis, Flora Elizabeth,	*Champaign,*	General, L. and A.
Dale, Elizabeth,	*Danville,*	General, L. and A.
Dart, Worthy Leigh,	*Rock Island,*	Architecture.
Davison, Herbert,	*Rock Falls,*	Classical.
DeFrees, Frederick Bradley,	*Indianapolis, Ind.,*	Civil Eng'g.
Dillon, Harvey Gere,	*Ludlow,*	Philosophy, S.
Dixon, Hewitt Smith,	*Kankakee,*	Electrical Eng'g.
Dobbins, Lester Charles,	*Champaign,*	Political Science.
Dowiatt, Stanislav,	*Chicago.*	Civil Engineering.
Drew, Fred Leon,	*Elgin,*	Civil Engineering.
Dunn, Ella May,	*Paris,*	General, L. and A.
Dunning, William Niel,	*Chicago,*	Mechanical Eng'g.
Dutch, Clarence Charles,	*Beardstown,*	General, L. and A.
Eagelston, Frank Ward,	*Bradford,*	Civil Engineering.
Eddy, Clarence LeRoy,	*Leslie, Ia.,*	Civil Engineering.
Edmonds, Mabel Josephine,	*Taylor,*	Math. and Phys., S.
Ellsworth, William Beverly,	*Deer Park,*	Architecture.
Few, Walter Henderson,	*Delavan,*	Electrical Eng'g.
Flickwir, Arthur Heath,	*Beardstown,*	Natural Science.
Foster, William Grant,	*Urbana,*	Architecture.
Frahm, Hattie Belle,	*Tuscola,*	General, L. and A.

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Francis, Frank D,	*New Lenox,*	Eng. and Mod. Lang.
Freeman, Harry Eben,	*Millington,*	Natural Science.
Garm, Roy Henry,	*Beardstown,*	Chemistry.
Garrett, Richard,	*Delavan,*	Political Science.
Gastman, Louise Antoinette,	*Decatur,*	General, L. and A.
Goldsmith, Elliott Robert,	*Oak Park,*	General, L. and A.
Griffiths, John, Jr.,	*Chicago,*	Civil Engineering.
Halderman, Edwin McAfee,	*Mt. Carroll,*	General, L. and A.
Hall, C Bertha,	*Urbana,*	General, L. and A.
Hannan, John Edward,	*Champaign.*	General, L. and A.
Hanson, Rachelle Margaret,	*Urbana,*	Natural Science.
Harker, Oliver Albert, Jr.,	*Carbondale,*	Eng. and Mod. Lang.
Harrison, Dale Stuart,	*Sterling,*	Civil Engineering.
Hartrick, Dinchen Clara,	*Urbana,*	Eng. and Mod. Lang.
Hartrick, Louis Eugene,	*Urbana,*	Eng. and Mod. Lang.
Hasson, Harry,	*Lewistown,*	Chemistry.
Hazzard, Nellie,	*Monticello,*	General, L. and A.
Henley, William Wheeler,	*Mattoon,*	Mechanical Eng'g.
Hinrichsen, Edward Eugene,	*Jacksonville,*	Electrical Eng'g.
Hodges, James Stewart,	*Denrock,*	Civil Engineering.
Horrom, William Alva,	*Atlanta,*	Civil Engineering.
Houtz, Francis Irwin,	*El Paso,*	Natural Science.
Hucke, Walter August,	*Belleville,*	Electrical Eng'g.
Iddings, Daisy Deane,	*Atlanta,*	General, L. and A.
Jackson, Walter Harker,	*Vienna,*	Civil Engineering.
Jame, Harry Adolph,	*Chicago,*	Natural Science.
Johnson, Charles Sunderland,	*Champaign,*	Mechanical Eng'g.
Johnson, Frederick Dawson,	*Alton,*	Mechanical Eng'g.
Johnson, James Edward,	*Champaign,*	General, L. and A.
Johnston, Arthur Russell,	*Joliet,*	General, L. and A.
Jordan, George Thomas,	*Tolono,*	General, L. and A.
Joy, Samuel Scott,	*Princeton,*	Architectural Eng'g.
Keeney, Henry Ezra,	*Sterling,*	Mechanical Eng'g.
Kellogg, Sarah Gertrude,	*Chicago,*	General, L. and A.
Kepler, George Frank,	*Ashtabula, Ohio,*	Architecture.
Kerns, Mazie White,	*Champaign,*	General, L. and A.
Ketchum, George Spencer,	*Champaign,*	Natural Science.
Kettenring, Henry Sylvester,	*Pekin,*	General, L. and A.
Kincaid, Charles Howard,	*Champaign,*	Mechanical Eng'g.
Kratz, James Piatt,	*Monticello,*	General, L. and A.
Kuehn, Alfred,	*Chicago,*	Civil Engineering.

Latzer, Jennie Mary,	*Highland,*	Natural Science.
Laugman, John Oscar,	*Lisbon,*	Natural Science.
Laycock, Mary Janet,	*Waverly,*	Natural Science.
Leupold, Frank,	*Millsdale,*	General, L. and A.
Logue, Charles Louis,	*Danville,*	Chemistry.
McCollum, Harvey Darling,	*Louisville,*	General, L. and A.
McCormick, Elsie Drene,	*Champaign,*	Natural Science.
McCune, Fred Leavitt,	*Sterling,*	Mechanical Eng'g.
McGee, Benjamin Franklin,	*New Burnside,*	General, L. and A.
McLane, Mrs. Blanche Keeney,	*Champaign,*	Architecture.
McLean, Charles Raymond,	*Princeton,*	Natural Science.
McLean, Elmer Lyman,	*Lombardville,*	Mechanical Eng'g.
McMurry, Fred Russell,	*Normal,*	General, L. and A.
McWilliams, Nellie Louise,	*Champaign,*	General, L. and A.
Main, Rose Ida,	*Pittsfield,*	Classical.
Mann, Frances,	*Danville,*	General, L. and A.
Martin, Robert William,	*Joliet,*	General, L. and A.
Mather, Lydia Maria,	*Joliet,*	Classical.
Maury, Harvey,	*Rossville,*	Civil Engineering.
Mayall, Edwin Lyman,	*Peoria,*	Mechanical Eng'g.
Means, Howard Chester,	*Bloomington,*	Civil Engineering.
Mesler, John Dickinson,	*Cobden,*	Electrical Eng'g.
Mundy, Robert Stephen,	*El Paso, Tex.,*	Electrical Eng'g.
Murray, Charles Brent,	*Le Roy,*	Electrical Eng'g.
Myers, Wynne,	*Champaign,*	General, L. and A.
Norton, Wilbur Perry,	*Alton,*	Electrical Eng'g,
Palmer, Bessie Shaw,	*Joliet,*	Classical.
Palmer, William Gay,	*Princeton,*	General, L. and A.
Pawling, Frank Henry,	*Wilmington,*	Electrical Eng'g.
Perry, John Nevin,	*Malden,*	Electrical Eng'g.
Pettinger, Robert Gerald,	*Cumberland, Ia.,*	Electrical Eng'g.
Plant, Sarah Lulu,	*Champaign,*	General, L. and A.
Pope, Edna Marian,	*Du Quoin,*	General, L. and A.
Popham, Jessie,	*Charleston,*	Natural Science.
Predmore, Mahlon,	*Avon,*	Architectural Eng'g.
Prickett, Fred William,	*Lewistown,*	Agriculture.
Radebaugh, Estella May,	*Champaign,*	Eng. and Mod. Lang
Radley, Guy Richardson,	*Sandwich,*	Electrical Eng'g.
Rapp, George Leslie,	*Carbondale,*	Architecture.
Raymond, John Eaton,	*Sidney,*	Agriculture.
Read, Fred Stanley,	*Urbana,*	Natural Science.

Reardon, Neal Daniel,	*Boynton*,	Natural Science.
Reimers, Fred William,	*Evanston*,	Electrical Eng'g.
Richardson, Robert Earl,	*Shipman*,	Classical.
Ricker, Raymond Craver,	*Harvey*,	Architecture.
Robbins, Ernest Thompson,	*Payson*,	Agriculture.
Robertson, Lloyde Silas,	*Barrington*,	Agriculture.
Robinson, Lawrence Penfield,	*Rockford*,	Natural Science.
Rochow, Carl John Frederick,	*Rock Island*,	Natural Science.
Safford, Edward Brigham,	*Sycamore*,	Chemistry.
Samson, Charles Leonard,	*Deers*,	Mechanical Eng'g.
St. John, Homer Erin,	*Rockford*,	Chemistry.
Satterlee, John Paul,	*Gales Ferry, Conn.*,	Mech. Eng'g.
Schneider, Edward John.	*Pontiac*,	Electrical Eng'g.
Schutt, Walter Robert,	*Belleville*,	General, L. and A.
Sherman, William Horace,	*Sullivan*,	Eng. and Mod. Lang.
Shuck, Ellen M,	*Urbana*,	General, L. and A.
Shuler, Hugh McWhurr,	*Gilchrist*,	Civil Engineering.
Smith, George Russell,	*Urbana*,	Mechanical Eng'g.
Smith, Kirby,	*Monticello*,	Electrical Eng'g.
Smith, William Walter,	*Broadlands*,	General, L. and A.
Smoot, Elma,	*Danville*,	General, L. and A.
Soverhill, Harvey Allen,	*Tiskilwa*,	Math. and Physics, S.
Spurgin, Isaac Meigs,	*Urbana*,	General, L and A.
Stakemiller, Benjamin Benton,	*Sterling*,	Civil Engineering.
Stubbins, Lewis Clark,	*Mattoon*,	Civil Engineering
Swift, Charles Clyde,	*Streator*,	Mechanical Eng'g.
Tait, Benjamin Franklin,	*Macon*,	General, L. and A.
Taylor, Walter Grant,	*Chicago*,	General, L. and A.
Tetrev, Henry,	*Chicago*,	Classical.
Thompson, Ralph,	*Carbondale*,	Eng. and Mod. Lang.
Thornton, Robert Ingersoll,	*Magnolia*,	Civil Engineering.
Thorpe, John Charles,	*Urbana*,	Mechanical Eng'g.
Tyler, Walter Simeon,	*Joliet*,	Electrical Eng'g.
Vance, William Herbert,	*Edwardsville*,	Civil Engineering.
Wason, Chester Herman,	*Canton*,	Electrical Eng'g.
Wehrstedt, Otto Charles,	*Evanston*,	Civil Engineering.
Wetherbee, Charles Earl,	*Sterling*,	Architecture.
Widmann, Otto,	*Old Orchard, Mo.*,	Natural Science.
Wiley, Raymond Sly,	*Seymour*,	Architecture.
Willis, Wilber Fred,	*Chicago*,	Civil Engineering.
Wolcott, Richard John,	*Batavia*,	Mechanical Eng'g.

Wood, Harvey Edgerton,	*Joliet*,	Chemistry.
Woods, William Francis,	*Ludlow*,	General, L. and A.
Zmrhal, Yaroslav,	*Chicago*,	Natural Science.

SPECIALS

Alarcó, Joseph Maria,	*Valencia, Spain*,	Electrical Eng'g.
Armstrong, Alice,	*Champaign*,	Music.
Arthur, Cora Minnie,	*Champaign*,	Art and Design.
Ayers, Lois Sigourney,	*Urbana*,	Art and Design.
Barnsback, Wilkie Louis,	*Edwardsville*,	Eng. and Mod. L.
Bear, Emma,	*Ludlow*,	Art and Design.
Bear, Ida Pauline,	*Ludlow*,	Art and Design.
Bevis, Grace,	*Urbana*,	Music.
Black, Mrs. Anna Eliza,	*Champaign*,	Philosophy.
Boyd, Bertha Marian,	*Roseville*,	Eng. and Mod. Lang.
Brower, Florence,	*Champaign*,	Music.
Brown, Mrs. Lucy Stewart,	*Urbana*,	Mathematics.
Busey, Allen,	*Urbana*,	Music.
Campbell, Mary Ellen,	*Rankin*,	Art and Design.
Capps, Mrs. Claudie Henry,	*Champaign*,	Music.
Capps, Herbert Norwood,	*Mt. Pulaski*,	Eng. and Mod. Lang.
Clark, Howard Wallace,	*Quincy*,	Art and Design.
Clark, Mabel Queenie,	*Urbana*,	Eng. and Mod. Lang.
Clifford, William Casimir,	*Champaign*,	Music.
Coleman, Calvin,	*Peoria*,	Architecture.
Crathorne, Annie Ellen,	*Champaign*,	Music.
Craw, Nellie Edna,	*Sadorus*,	Music.
Dolan, William John,	*Ohio*,	Philosophy.
Draper, Charlotte Leland,	*Urbana*,	Music.
Duis, Frederick Bernhardt,	*Dorsey*,	Civil Engineering.
Dunlop, Archibald Bard,	*Dwight*,	Political Science.
Easton, Louis Byron,	*Hudson*,	Natural Science.
Ebersol, Elmer Tryon,	*Ottawa*,	Natural Science.
Elder, Ethel,	*Streator*,	Latin.
Finch, Winfield Scott,	*Verona*,	Agriculture.
Ford, Ralph Leo,	*Lewistown*,	Electrical Eng'g.
Gould, Guy Torrence, Jr.,	*Chicago*,	Natural Science.
Green, Pearl Mary,	*Champaign*,	Music.
Gregg, Robert Irwin,	*Freedom*,	Eng. and Mod. Lang.
Grinnell, Jesse Clare,	*Mayfair*,	Art and Design.

Halls, Frank Ernest,	*Chicago*,	Architecture.
Hartman, Nellie Eleanor,	*Homer*,	Music.
Havard, Jennie,	*Urbana*,	Music.
Heath, Bessie Beatrice,	*Champaign*,	Eng and Mod. Lang.
Heath Noble Porter,	*Champaign*,	Agriculture.
Hershey, Herbert Emmons,	*Nebraska City, Neb.*,	Nat. Science.
Hitz, Kate Ellen,	*Ludlow*,	Math. and Phys.
Hulsebus, Bernhard Lubertus,	*Saxon, Ia.*,	Architecture.
Kaufman, Mrs. Hattie F.,	*Champaign*,	Music.
Kennedy, Alice Richart,	*Fredonia*,	Art and Design.
Ketchum, Mary Phronia,	*Champaign*,	Art and Design.
Lampe, Margaret Henrietta Johanne,	*Bloomington*,	Eng. and Mod. Lang.
Leal, Rosa Belle,	*Urbana*,	Eng and Mod. Lang.
Lewis, Stanley Melville,	*Urbana*,	Art and Design.
Lutton, Frank Carlyle,	*Rutland*,	Eng. and Mod. Lang.
McConkey, Maud Nellie,	*Champaign*,	Music.
McGaffy, Ancil,	*Woosung*,	Eng. and Mod. Lang.
McGee, Eleanor,	*New Burnside*,	Eng. and Mod. Lang.
McLane, Elmer Cavett,	*Allerton, Ia.*,	Classical.
McLaughlin, Nora Elvira,	*Penfield*,	Music.
Magoon, Cornelia,	*Champaign*,	Music.
Mather, Grace Ella,	*Joliet*,	Art and Design.
Miller, Alvin George,	*Urbana*,	Agriculture.
Miller, Nellie Decker,	*Mattoon*,	Art and Design.
Moore, Lucy Kate,	*Pesotum*,	Music.
Nabstedt, Frederick,	*Davenport, Ia.*,	Electrical Eng'g.
Orcutt, Dwight Chapman,	*Arcola*,	Natural Science.
Padget, Will	*Palmyra*,	Political Science.
Peterson, Ferdinand Ludwig,	*Fieltofte, Denmark*,	Architecture.
*Philips, Thomas Lewis,	*Mt. Carroll*,	Eng. and Mod. Lang.
Phipps, Josie May,	*Urbana*,	Art and Design.
Porterfield, Kizzie Gertrude,	*Champaign*,	Music.
Purviance, Libbie Jane,	*Pleasant Plains*,	Music.
Quirk, Elizabeth,	*Champaign*,	Music.
Reynolds, Elodie May,	*Golden*,	Art and Design.
Rhoads, Emma May,	*Champaign*,	Eng. and Mod. Lang.
Rhodes, Edward Melvin,	*Bloomington*,	Political Science.
Riley, George Washington,	*Champaign*,	Art and Design.
Sandberg, Carl Eric,	*Köping, Sweden*,	Architecture.
Schaefer; Peter Philip,	*Carlyle*	Political Science.

*Should be entered as a Junior.

Sconce, Harvey James,	*Sidell,*	Agriculture.
Scudder, Benjamin Harrison,	*Wind Fall, Ind.,*	Philosophy.
Shirley, Zelda Marion,	*Champaign,*	Music.
Smick, Mary Ella,	*Athens,*	Music.
Somers, Mabel Carson,	*Urbana,*	Music.
Sparks, Laura Irene,	*Manchester, Tenn.,*	Eng. Mod. Lan.
Stanner, Joseph Joel,	*Urbana,*	Eng. and Mod. Lang.
Stanton, Burt Tompkins,	*Chicago,*	Mechanical Eng'g.
Steele, Ella,	*Sullivan,*	Art and Design.
Still, Samuel Jay,	*Cerro Gordo,*	Civil Engineering.
Tarrant, William Henry,	*Champaign,*	Civil Engineering.
Thompson, Risty Melroy,	*Murdock,*	Mechanical Eng'g.
Tillotson, Mabel,	*Urbana,*	Music.
Tompkins, Clara Alice,	*Grover,*	Philosophy.
Van Patten, Ida,	*Steward,*	Art and Design.
Weaver, Edith Maria,	*Urbana,*	Eng. and Mod. Lang.
Williams, Marcus Lafayette,	*Urbana,*	Eng. and Mod. Lang.
Wright, Marion,	*Urbana,*	Eng. and Mod. Lang.

PREPARATORY

Allen, Roy Skillman,	*Santa Monica, Cal.*
Armold, Clarence Scarborough,	*Payson.*
Arthur, Charles Alvin,	*Champaign.*
Atterbery, Osbert Holbrook,	*Urbana.*
Baker, Horatio Weber,	*Champaign.*
Ball, Harry Braucher,	*Clinton.*
Barnett, Arthur,	*Hallsville.*
Bartholomew, Ross,	*Vermont.*
Beal, John Franklin,	*Mt. Vernon.*
Beasley, Sally Louise,	*Champaign.*
Beebe, Florence Jennie,	*Blunt, S. Dak.*
Benner, William John,	*Woodburn.*
Black, Alice Mary,	*Urbana.*
Black, Laura Louise,	*Urbana.*
Blank, Warren Moffatt,	*Granger.*
Bohnert, Lottie May,	*Pleasant Plains.*
Boon, Harry Lehrie,	*Armstrong.*
Bowen, Charles Fremont,	*Stronghurst.*
Bowen, Fred Anderson,	*Stronghurst.*
Brown, Warren Howe,	*Urbana.*
Buchanan, Charles Albert,	*Paris.*

Buchanan, Edwin Boyd,	*Paris.*
Calhoun, Etta Ann,	*Champaign.*
Carper, Ulysses Stanton,	*Champaign.*
Carson, Frank,	*Urbana.*
Carson, Jefferson,	*Mortimer.*
Carter, Opal Gertrude,	*Champaign.*
Casserly, Marguerite May,	*Champaign.*
Chandler, Charles Forrest,	*Chicago.*
Charles, Clayton Henry,	*Woodstock.*
Churchill, Della Almon,	*Kinderhook.*
Clark, William Owen,	*Scottland.*
Clements, Maurice Perry,	*Bushnell.*
Collins, Guy Richard,	*Champaign.*
Crossland, George Marshall,	*Sheldon.*
Dale, Georgia,	*Danville.*
Dinwiddie, Elizabeth,	*Champaign.*
Donovan, Edward James,	*Donovan.*
Draper, Charlotte Enid,	*Hakodate, Japan.*
Draper, Edwin Lyon,	*Urbana.*
Drury, Clair Fred,	*New Boston.*
Dunkin, Gilbert Leslie,	*Urbana.*
Ege, John Frank,	*Cordova.*
Eno, Imle L,	*Pomona, Cal.*
Evans, Waldo Carl,	*Danville.*
Finch, Jesse Peter,	*Verona.*
Fiscus, Rilla,	*Arney, Ind.*
Forbes, Ethel Clara Schumann,	*Urbana.*
Forbes, Winifred,	*Urbana.*
Frazier, Edgar Jacob,	*Paris.*
Freeman, Julius Buckingham,	*Bloomington.*
Frost, Frank G,	*Gays.*
Fuqua, Albert Turner,	*Worthington, Minn.*
Garvin, Joseph Aloysius,	*Memphis, Tenn.*
Gerould, Theodore Fleming,	*Centralia.*
Gifford, Roy Lytton,	*Rantoul.*
Gorham, Maude Ulrich,	*Champaign.*
Gould, Frank Jared,	*Belvidere.*
Gray, Robert,	*Lily Lake.*
Green, Frances Myrtle,	*Urbana.*
Green, Josephine Maxwell,	*Ramsey.*
Grigsby, Clarence A,	*Blandinsville.*

Grigsby, Harry Mason,	*Blandinsville.*
Grigsby, Willehrman,	*Blandinsville.*
Griswold, Lewis Edwin,	*Blue Mound.*
Haake, Charles John,	*Chicago.*
Haakinson, William Herbert,	*Sloan, Ia.*
Hammers, Lewis Joseph,	*Panola.*
Hanson, Gertrude Lucile,	*Urbana.*
Harbeson, Davis Lawler,	*Stewardson.*
Harker, George Mifflin,	*Carbondale.*
Harris, Thomas Luther,	*Modesto.*
Hartrick, Guy Russell,	*Urbana.*
Hartrick, Nancy Emma,	*Urbana.*
Harvey, Raymond Wade,	*Griggsville.*
Hayes, Zella Bernice,	*Rankin.*
Hidy, Llora Mabel,	*Mansfield.*
Hill, Louis Henry,	*Sheldon.*
Hobart, Harry Edwin,	*Armington.*
Husk, Frederick William,	*Shabbona,*
Ijams, Catherine Harriet,	*Urbana.*
Jack, Robert Douglas,	*Morrison.*
Jones, McMillan,	*Paris.*
Kemmerer, John Martin,	*Assumption.*
Kennedy, Roy McClure,	*Peoria,*
Kincaid, Anna Laura,	*Champaign.*
Kirby, Nellie Maye,	*Monticello.*
Kraft, Albert John,	*Arenzville.*
Kramer, Arthur William,	*Castalia, Ia.*
Kuhn, Leopold,	*Champaign.*
Lark, George Maronia,	*Ruma.*
Leib, Harvey Ellsworth,	*Exeter.*
Lewis, Addison Thompson,	*Chatham.*
Lewis, Delia Hope,	*Oblong.*
Little, Lew McClain,	*Urbana.*
Locke, Alfred Thomas,	*Blandinsville.*
McCarthy, Daniel Joseph,	*Chandlerville.*
McCormick, Roscoe,	*Garber.*
McLean, George Harvey,	*Normal.*
Magner, Harold Bernard,	*Morris.*
Manny, Clay Yates,	*Urbana.*
Martin, Webb Wilde,	*Chicago.*
Martinie, Charles Austin,	*Palermo.*

Mathews, Clyde Milton,	*Urbana.*
Mautz, Edmund Jacob,	*Stewardson.*
Maxon, Maywood Austin,	*Urbana.*
Mell, John Deloss,	*San Jose.*
Mendenhall, Scott,	*Springfield.*
Miles, Rutherford Thomas,	*Urbana.*
Monier, William Hays,	*Champaign.*
Moore, George Elmer,	*Monticello.*
Moore, Zadok Casey,	*Tamalco.*
Moorshead, Alfred Lee,	*St. Louis, Mo.*
Morris, Robert Lyman,	*Maroa.*
Morrison, George Emmet,	*Urbana.*
Mykins, Perry H,	*Battle Creek, Mich.*
Newcomb, Cyrus Forsyth.	*Champaign.*
Nowlin, Jont A,	*Decatur.*
O'Hair, Edna,	*Laurel, Ind.*
Olson, Joseph Matthias,	*Seneca.*
Ordel, Franklin,	*Philo.*
Patterson, Grace Amelia,	*Urbana.*
Perrigo, Lyle Donovan,	*Donovan.*
Poland, Benjamin Forrest,	*Danville.*
Pollard, Earle Royal,	*Centralia.*
Pollock, Addie Belle,	*Millburn.*
Power, Jay William,	*Cantrall.*
Pritchard, William,	*Memphis, Tenn.*
Quinn, Jennie May,	*Oliver.*
Read, Edgar Newton,	*Urbana.*
Read, Nellie L,	*Urbana.*
Roche, Edward Francis,	*Rock Island.*
Rogers, Howard Ezra,	*Mendota.*
Rogers, Lawrence Stevens,	*Mendota.*
Sawyer, George Kingsley,	*Carpentersville.*
Schulte, Mabel,	*Hopedale.*
Scott, Vera Charlotte,	*Mahomet.*
Shea, Willard Wright,	*Danville.*
Simpson, Clarence Oliver,	*Hindsboro.*
Slocum, Roy Harley,	*Loda.*
Snyder, Simeon M,	*Metamora.*
Sparks, Annie Elnora,	*Urbana.*
Sparks, Elbert Isaiah,	*Manchester, Tenn.*
Spink, Marcus LeRoy,	*Chandlerville,*

Stanley, Harvey Hatten,	*Champaign.*
Stanley, Mrs. Mabel Eddith,	*Champaign.*
Stanley, Otis Orion,	*Champaign.*
Stewart, John Hardin, Jr.,	*Exeter.*
Stoltey, Emma Maria,	*Champaign.*
Stoltey, Jennie Florence,	*Champaign.*
Tallyn, Louis Liston,	*Benson.*
Thompson, Frank Linn,	*Warrensburg.*
Thompson, James William,	*Tuscola.*
Thompson, Lenora Belle,	*Steward.*
Thompson, Willard Carr,	*Canton.*
Toops, George Noble,	*Seymour.*
Trevett, Helen Mary,	*Champaign.*
Trevett, John Howard,	*Champaign.*
Vail, Albert Barnes,	*Chicago.*
VanBrundt, Chester,	*Champaign.*
VanVillars, Victor,	*Fairmount.*
Wait, Ernest Ludden,	*Urbana.*
Walker, Arthur Child,	*Moline.*
Wamsley, Mae,	*Urbana.*
Warner, Harry Jackson,	*Prophetstown.*
Watson, James Robert,	*Opechee, Mich.*
Webber, Bernard Porter,	*Wenona.*
Weldon, Eveleen Marie,	*Verona.*
Weldon, William John,	*Verona.*
West, Roy Campbell,	*Gilman.*
Whipple, Fred George,	*Chicago.*
Wilcox, Emmons John,	*Seneca.*
Wilkins, Leroy Mackentire,	*Pembina, N. Dak.*
Williams, Seymour,	*Monticello.*
Williamson, Josephine Hulda,	*Champaign.*
Wohlfarth, Minnie,	*Urbana.*
Woltzen, Adolph,	*Benson.*
Womacks, Nita,	*Champaign.*
Wright, Edith,	*Urbana.*
Zilly, Fred McKinley,	*Champaign.*

WINTER SCHOOL IN AGRICULTURE—1897

Bondurant, Frank Leigh,	*Paxton.*
Brumback, Almon,	*Danforth.*
Clifton, Marion,	*Urbana,*

Decker, William John,	*Tiskilwa.*
Emig, Francis,	*Champaign.*
Havard, Bert Henry,	*Urbana.*
Hollister, Ross Odell,	*Loda.*
Howell, Carrie Barnes,	*Champaign.*
Kickler, Charles Henry,	*Mackinaw.*
Maxcy, Leigh Forest,	*Pasfield.*
Monroe, Joshua Wales,	*Plainfield.*
Parr, Thomas Albert,	*Urbana.*
Roberts, Washington Irving,	*Urbana.*
Slater, George Albert,	*Polo.*
Wilhite, Chalda Roy,	*Bluff Creek, Ind.*
Yates, Irving Brown,	*Dunlap.*

STUDENTS AND INVESTIGATORS IN ATTENDANCE AT THE BIOLOGICAL STATION, JUNE-AUG., 1896

C. C. Adams, B.S., Assistant in Biology, Illinois Wesleyan University, *Bloomington*, Dragon-flies.

H. C. Beardslee, A.B., Instructor in Science, University School, *Cleveland, Ohio*, Fleshy fungi, Myxomycetes, and aquatic flora.

L. Lenore Conover, B.S., Teacher of Botany, High School, *Detroit, Michigan*, Algæ and Myxomycetes.

Charles Fordyce, Principal of the Normal Department, Biology, Nebraska Wesleyan University, *University Place, Nebraska*, Fresh-water Algæ and general biology.

H. A. Fraser, B.S., Teacher of Biology, High School, *Joliet*, Fresh-water sponges and general biology.

W. K. Hill, A.B., Superintendent of Schools, *Carthage*, Fresh-water Algæ.

G. W. Horton, Superintendent of Schools, *Dwight*, Rhizopoda and general biology.

H. M. Kelly, A.M., Professor of Biology, Cornell College, *Mt. Vernon, Ia.*, Trematoda parasitic in clams.

J. G. Needham, M.S., Instructor in Zoölogy, Knox College, *Galesburg*, Life histories of dragon flies.

C. S. Oglevee, B.S., Instructor in Zoölogy and Botany, Lincoln University, *Lincoln*, Protozoa and general biology.

C. E. Phillips, Student at Eureka College, Eureka, Illinois, *Millington*. General biology.

Mrs. W. S. Pierce, Teacher of Science, High School, *Havana*, General biology.

Maurice Ricker, B.S., Teacher of Chemistry and Biology, High School, *Burlington, Ia.*, Hydrachnidæ and general biology.

L. S. Ross, M.S., Professor of Biology and Geology, Drake University, *Des Moines, Ia.*, Cladocera of Iowa and Manitoba.

F. W. Schacht, Univ. of Ill., *Moline*, The Centropagidæ of the locality in connection with thesis investigation.

R. W. Sharpe, B.S., Teacher of Biology, High School, *Danville*, Ostracoda.

C. A. Whiting, Sc.D., Professor of Biology, University of Utah, *Salt Lake City, Utah*, General biology.

SCHOOL OF PHARMACY

SENIORS

Allen, Eugene Daniel,	*Marseilles.*
Babb, Alma,	*Remington, Ind.*
Balensiefer, Otto,	*Joliet.*
Behmer, Otto Theobald Ehrhardt,	*Chicago.*
Behrens, Frederick Ferdinand Francis,	*Chicago.*
Bignold, Wilfrid James,	*Waukegan.*
Boudinot, John Elliot,	*Danville.*
Boyce, Harry Arthur,	*Mt. Vernon, Ind.*
Brown, Harvey Waterman,	*Chicago.*
Buchner, Frederick Edward Albert,	*Chicago.*
Burritt, Perley,	*Chicago.*
Clark, Harry Alexander,	*Carmi.*
Clyde, Albert Eugene,	*Chicago.*
Dieden, Frank Xavier,	*Chicago.*
Dittman, George Charles,	*Chicago.*
Doederlein, Rudolph H,	*Chicago.*
Elliott, Elizabeth,	*Peotone.*
Fisher, Emil John,	*Chicago.*
Friedgen, Harry Raymond,	*Columbus, Ind.*
Fulghum, Charles Clifford,	*Richmond, Ind.*
Gilbert, Carl Edward,	*Blair, Wis.*
Gordon, Howard Edward,	*Hobart, Ind.*
Harper, Micajah Anderson,	*Chesterton, Ind.*
Hoch, Charles Frederick,	*Hamilton, Ind.*
Hull, Harry Peck,	*Chicago.*
Jacobus, Peter William,	*La Crosse, Wis.*
Jerichi, Frederick William,	*Mt. Pleasant, Ia.*

Johnson, George Gilmore,	*Norwich, Kan.*
Jones, Charles Everett,	*Greenwood.*
Kampman, Arthur,	*Chicago.*
Landau, David,	*Chicago.*
Lange, Louis,	*Chicago.*
Loeffler, Richard August,	*Chicago.*
McGoey, Joseph Aloysius,	*Chicago.*
Mark, George Andrew,	*Chicago.*
Mehrlich, Harry Charles,	*Black Hawk, Colo.*
Menn, Harry George,	*Quincy.*
Mrazek, Leopold Ludwig,	*Chicago.*
Newman, Joseph Henry,	*Chicago.*
Parsons, Edward Charles,	*Parker, S. Dak.*
Phipps, Luther Hansford,	*Chicago.*
Pier, Harry James,	*Hurley, S. Dak.*
Plautz, Henry Frederick,	*Chicago.*
Porges, Otto,	*Chicago.*
Renshaw, Charles Johnson,	*Normal.*
Robin, Luba Julia,	*Chicago.*
Schwarz, Hiram,	*Chicago.*
Sheppard, Samuel Henry,	*Jacksonville.*
Sherman, Clinton Robert,	*Lena.*
Smith, George Irving Washington,	*Shelton, Neb.*
Storen, Mark Thomas,	*Rockford.*
Sweeney, John Daniel,	*Chicago.*
Van Buren, Evert,	*Chicago.*
Waldron, William Frederick,	*Chicago.*
Wiener, Justin Sumner,	*Alexandria, S. Dak.*
Winne, Charles Walter,	*Chicago.*
Wooster, Mortimer Safford,	*Norwalk, Ohio.*

JUNIORS

Agness, Merle Ardel,	*Converse, Ind.*
Ashmore, Joseph Samuel,	*Elizabeth.*
Atzel, George William,	*Chicago.*
Bauer, Herbert Arthur,	*Kilbourn City, Wis.*
Barclay, James T,	*Oak Park.*
Biese, Carl August,	*Chattanooga, Tenn.*
Bradley, Clarence Henry,	*West Chicago.*
Brenner, Bert Lemon,	*Rensselaer, Ind.*
Brenner, George Frederick,	*Fowler.*

Briel, Louis Mathias,	*Ottawa.*
Bruce, Alexander John,	*Chicago.*
Brown, Frederick Edgar,	*Sterling.*
Bugg, Edward,	*Austin.*
Byerline, Albert Delos,	*Springfield.*
Clancy, Albert Clarence,	*Chicago.*
Conger, Fred Lauren,	*Galesburg.*
Cooke, Lynds Sherman,	*Momence.*
Daley, William Henry,	*Nashua, Ia.*
Davis, Justin,	*North Chicago.*
Dethlefsen, George,	*Chicago.*
Donaberger, Samuel Bricker,	*Lebanon, Pa.*
Eckart, Henry Christian,	*Chicago.*
Elich, Louis Herman Frederick,	*Chicago.*
Elisburg, Louis Albert,	*Chicago.*
Epmeier, Paul,	*Evansville, Ind.*
Fairbrother, Rolla Lon,	*Wyaconda, Mo.*
Farbrich, Frank Allen,	*Chicago.*
Farch, William Frederick,	*Chicago.*
Farley, James Parks,	*Eddyville, Ia.*
Fina, Peter Frank,	*Kankakee.*
Fleer, Frank William,	*Quincy.*
Flomer, Henry William,	*Chicago.*
Freeman, Arthur Wardo,	*Vermont.*
Gakenheimer, Christian Frederick,	*Baltimore, Md.*
Goeppner, George Christopher,	*Chicago.*
Gray, Mrs. Margaret McClintock,	*Chicago.*
Halleran, Edward Milford,	*Ackley, Ia.*
Harris, Andrew Hope,	*Alexandria, S. Dak.*
Hathaway, Charles Edwin,	*Savanna.*
Hellmuth, Joseph Anthony,	*Chicago.*
Henninger, Austin,	*Chicago.*
Hertzberg, Henry,	*Kankakee.*
Holmsted, Axel Sanfred,	*Chicago.*
Hosteny, Joseph Nevi,	*Chicago.*
Houseman, Gilbert,	*Chicago.*
Howard, Arthur Edwin,	*La Crosse, Wis.*
Ishmael, Melvin,	*Prairie du Chien, Wis.*
Kappus, George Jacob,	*Tiffin, Ohio.*
Kepert, Andrew,	*Hammond, Ind.*
King, Clarence Eugene,	*Chicago.*

Kloppenburg, Joseph Robert,	*Springfield.*
Koropp, Ernest August,	*Mendota.*
Kosminsky, Leon,	*Texarkana, Texas.*
Kost, Frank Lyle,	*Joplin, Mo.*
Kremer, Frank,	*Chicago.*
Kucrea, Anton, Jr.,	*Hazelhurst, Wis.*
Lauber, Bohumil,	*Chicago.*
Linxwiler, Albert,	*Hillsboro.*
Littlefield, Charles Edward,	*Dallas, Texas.*
Lorenz, John Stanley,	*Chicago.*
Love, Charles Reynolds,	*Savanna.*
McLeish, John Nesbit,	*Portage, Wis.*
Maier, Bertram,	*Chicago.*
Matteson, Daniel,	*Traverse City, Mich.*
Meisel, Seymour Ralph,	*Chicago.*
Mense, Clement,	*Washington, Mo.*
Monti, George Joseph,	*Genoa, Wis.*
Moore, Algy Charles,	*Kankakee.*
Mosser, William,	*Palatine.*
Neubauer, Walter,	*Chicago.*
Neverman, Edwin Paul Albert,	*Neillsville, Wis.*
Newman, Elbert Ray,	*Streator.*
Nikola, Joseph,	*Chicago.*
Okonski, John Anton,	*Chicago.*
Olsen, Egil Thorbjorn,	*Chicago.*
Patterson, James Archibald,	*Chicago.*
Paus, Charles,	*Chicago.*
Preib, Michael John,	*Chicago.*
Price, Walter Thomas,	*Honey Grove, Texas.*
Psybylski, Adam Stanislaus,	*Chicago.*
Rakebrand, Charles,	*Chicago.*
Rockwood, Lewis Chester,	*Portage, Wis.*
Ruhland, Charles Theodore Frederick William,	*Chicago.*
Schrayer, Nathan,	*Chicago.*
Schuetz, Ziska Erhart,	*Mendota.*
Schultz, Emil Henry,	*Neenah, Wis.*
Schultz, Gustav Henry,	*Danville.*
Schwuchow, Walter Bernard,	*Chicago.*
Seibert, Daniel Peter,	*Ashley.*
Siedenburg, Frank,	*Elizabeth.*
Smale, William,	*Chicago.*

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Zerm, John Gideon,	*Good Hope.*

SUMMARY OF STUDENTS—1896-97

	Men	*Women*	*Total*
Graduate School	37	5	42
Resident Graduates	13	2	15
Seniors	88	11	99
Juniors	92	10	102
Sophomores	125	28	153
Freshmen	147	34	181
Specials	40	51	91
Total in University	542	141	683
Preparatory School	136	43	179
Students and Investigators at Biological Station	15	2	17
School of Pharmacy—Seniors	54	3	57
Juniors	121	3	124
Winter School in Agriculture, 1897	15	1	16
	883	193	1076
Deduct counted twice	1		1
Total	882	193	1075

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Mattoon High School,	Henley, William W.

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Cook, 9th Senatorial District,	Rudnick, Paul F. A.
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Vermilion,	Radebaugh, Estella M.

CHICAGO CLUB LOAN FUND

Mesiroff, Joseph.

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Color Sergeant, C. Capron.

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THE UNIVERSITY CALENDAR

1897–98

FALL TERM, 1897

Sept. 9, Thursday.	Entrance Examinations begin.
Sept. 13, 14, Monday and Tuesday.	Registration Days.
Sept. 15, Wednesday.	Instruction begins.
Nov. 8, Monday.	Latest date for announcing Subjects of Theses.
Nov. 25, Thursday.	Thanksgiving Recess.
Nov. 29, Monday.	Instruction resumed.
Dec. 23, Wednesday.	Term Examinations begin.
Dec. 24, Friday.	Term ends.

WINTER TERM, 1898

Jan. 3, Monday.	Entrance Examinations.
Jan. 4, Tuesday.	Registration Day.
Jan. 5, Wednesday.	Instruction begins.
Feb. 21, Monday.	Prize Debate.
March 21, Monday.	Term Examinations begin.
March 23, Wednesday.	Term ends.

SPRING TERM, 1898

March 29, Tuesday.	Registration Day.
March 30, Wednesday.	Instruction begins.
May 12, 13, Thursday and Friday.	University High School Conference.
May 13, Friday.	Interscholastic Oratorical Contest.
May 14, Saturday.	Interscholastic Athletic meet.
May 23, Monday.	Hazleton Prize Drill.
May 24, Tuesday.	Competitive Drill.
May 31, Tuesday.	Latest Day for Acceptance of Theses.

June 1, Wednesday. Term Examinations begin.
June 5, Sunday. Baccalaureate Address.
June 6, Monday. Class Day.
June 7, Tuesday. Alumni Day and Oratorical Contest.
June 8, Wednesday. Twenty-sixth Annual Commencement.

FALL TERM, 1898

Sept. 8, Thursday. Entrance Examinations begin.
Sept. 12, 13, Monday and Tuesday. Registration Days.
Sept. 14, Wednesday. Instruction begins.
Nov. 7, Monday. Latest date for announcing Subjects of Theses.
Nov. 24, Thursday. Thanksgiving Recess.
Nov. 28, Monday. Instruction resumed.
Dec. 21, Wednesday. Term Examinations begin.
Dec. 23, Friday. Term ends.

1897

SEPTEMBER

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1898

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DECEMBER

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Learning and Labor

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1897-98

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STATE LABORATORY OF NATURAL HISTORY

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STATION STAFF

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UNIVERSITY OF ILLINOIS

LOCATION

The University of Illinois is situated in Champaign County, in the eastern central part of the state between the cities of Champaign and Urbana, within the corporate limits of the latter. It is one hundred and twenty-eight miles south of Chicago, at the junction of the Illinois Central, the Cleveland, Cincinnati, Chicago and St. Louis, and the Wabash railroads. The country around is a rich and prosperous agricultural region. The cities of Urbana and Champaign have a combined population of about 15,000.

HISTORY

In 1862 the national government donated to each state in the Union public land scrip in quantity equal to 30,000 acres for each senator and representative in congress, "for the endowment, support and maintenance of at least one college, whose leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts * * * * in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

On account of this grant the state pays the University, semi-annually, interest at the rate of five per cent. on about $460,000, and the University owns about 11,000 acres of unimproved land worth approximately $140,000.

To secure the location of the University several counties entered into competition by proposing to donate to its use specified sums of money, or their equivalent. Cham-

paign County offered a large brick building, erected for a seminary and nearly completed, about 1,000 acres of land, and $100,000 in county bonds. To this the Illinois Central Railroad added $50,000 in freight. In consideration of this offer the institution was located, May 8, 1867, in the suburbs of Urbana.

The state legislature has from time to time appropriated various sums for permanent improvements, as well as for maintenance. The present value of the entire property and assets is estimated at $1,600,000.

The institution was incorporated the last day of February, 1867, under the name of the Illinois Industrial University, and placed under the control of a Board of Trustees, constituted of the Governor, the Superintendent of Public Instruction and the President of the State Board of Agriculture, as *ex-officio* members, and twenty-eight citizens appointed by the Governor. The chief executive officer, usually called President, was styled Regent, and was made *ex officio* a member of the Board and presiding officer both of the Board of Trustees and of the Faculty.

In 1873 the Board of Trustees was reorganized, the number of appointed members being reduced to nine and of *ex-officio* members to two—the Governor and the President of the State Board of Agriculture. In 1887 a law was passed making membership elective at a general state election and restoring the Superintendent of Public Instruction as an *ex-officio* member. There are, therefore, now three *ex-officio* members and nine by public suffrage. Since 1873 the President of the Board has been chosen by the members from among their own number for a term of one year.

The University was opened to students March 2, 1868, when there were present, beside the Regent, three professors and about fifty students. During the first term another instructor was added, and the number of students increased to 77—all young men.

During the first term instruction was given in algebra, geometry, physics, history, rhetoric, and Latin. Work on

the farm and gardens or about the buildings was at first compulsory for all students, but in March of the next year compulsory labor was discontinued, save when it was made to serve as a part of class instruction. A chemical laboratory was fitted up during the autumn of 1868. Botanical laboratory work began the following year. In January, 1870, a mechanical shop was fitted up with tools and machinery, and here was begun the *first shop instruction* given in any American university. During the summer of 1871 the present Engineering Laboratory was erected and equipped for students' shop work in both wood and iron.

By vote, March 9, 1870, the Trustees admitted women as students. During the year 1870-71 twenty-four availed themselves of the privilege. Since that time they have constituted from one-sixth to one-fifth of the total number of students.

By the original state law certificates showing the studies pursued and the attainments in each were given instead of the usual diplomas and degrees. The certificates proved unsatisfactory to the holders, and in 1877 the legislature gave the University authority to confer degrees.

In 1885 the legislature changed the name of the institution to the "University of Illinois."

During the same session of the legislature a bill was passed transferring the State Laboratory of Natural History from the Illinois State Normal University to the University of Illinois. This Laboratory was created by law for the purpose of making a natural history survey of the state, the results of which should be published in a series of bulletins and reports, and for the allied purpose of furnishing specimens illustrative of the flora and fauna of the state to the public schools and to the state museum. For these purposes direct appropriations are made by the legislature from session to session. A large amount of material has been collected and extended publications have been made in both the forms above mentioned.

By an act approved March 2, 1887, the national gov-

ernment appropriated $15,000 per annum to each state for the purpose of establishing and maintaining, in connection with the colleges founded upon the congressional act of 1862, agricultural experiment stations, "to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science." Under this provision the station for Illinois was placed under the direction of the Trustees of the University, and its grounds were located on the University farm. At least one bulletin of results is published every three months, and the copies are gratuitously distributed over the state. Editions of 18,000 copies are now issued.

For the more complete endowment of the state institutions founded upon the act of 1862, the congress of the United States, by a supplementary law passed in 1890, made further appropriations. Under this enactment each such college or university received the first year $15,000, the second $16,000, and thereafter was to receive $1,000 per annum additional to the amount of the preceding year, until the amount reached $25,000, which sum was to be paid yearly thereafter.

The total appropriations by the state to the University for all purposes to date amount to $1,793,164.

BUILDINGS AND GROUNDS

The land occupied by the University and its several departments embraces about 210 acres.

The Chemical Laboratory is a building 75 by 120 feet, and two stories high, with basement. It contains general laboratories for students, instructors' laboratories, lecture rooms, store rooms, scale rooms, and various apartments for special purposes.

Engineering Hall has a frontage of 200 feet, a depth of 76 feet on the wings and 138 feet in the center. The first story contains the laboratories of the departments of physics

and electrical engineering, and the masonry laboratories and instrument rooms of the department of civil engineering. The second story contains the lecture room and the preparation rooms of the department of physics, and the recitation and drawing rooms, cabinets, and studies of the departments of civil and municipal engineering. The third story contains the laboratory of the department of physics, the drawing rooms, lecture rooms, cabinets, and studies of the mechanical departments, as well as the library, the office, and the faculty parlor. The fourth story is devoted to the department of architecture, and contains drawing and lecture rooms, cabinets, a photo studio, and a blue-print laboratory.

The Wood Shops and Testing Laboratory is two stories high, 126 feet in length, and 88 feet in width, and contains the laboratory of applied mechanics, the hydraulic laboratory, and the mechanical engineering laboratory. The wood shop of the mechanical engineering department is situated on the first floor of this building.

The Metal Shops is a one-story brick building, 50 by 250 feet. It contains a lecture room, two office rooms, a machine shop, a foundry, and a forge shop. The machine shop is 48 by 140 feet. Power is brought to this shop from the Wood Shops and Testing Laboratory by a 30-horse power rope drive. A three-ton traveling crane of 12 foot span covers the center of the floor for the entire length, extending over a covered driveway between the machine shop and foundry. The floors of the foundry, cupola room, and forge shop are three feet below the floor of the machine shop.

The Mechanical and Electrical Engineering Laboratory is a pressed brick building, two stories high, 100 feet long and 50 feet wide, with a one-story wing 90 feet long and 50 feet wide. There is also a basement under the main part, containing some special testing rooms, store rooms, and the toilet and wash rooms.

The Central Heating Station is a brick building, 55 by 120 feet. It contains the apparatus used for heating the

buildings on the campus. An annex contains the pump room and the stock room. The pipes of the heating system and the wires for power and light, are carried from the Central Heating Station to the several buildings through brick tunnels 6½ feet high by 6 feet wide. The length of tunnel thus far constructed is 1,800 feet.

Military Hall, 100 by 150 feet, in one grand hall, gives ample space for company and battalion manœuvres and for large audiences upon special occasions.

Natural History Hall is 134 by 94 feet, with basement, two main stories and an attic. It is occupied by the departments of botany, zoölogy, physiology, mineralogy, and geology, for each of which there are laboratories, lecture rooms, and offices; it also contains the office and equipments of the State Laboratory of Natural History, and of the State Entomologist, as well as the office, library, and chemical laboratory of the Agricultural Experiment Station. There are six laboratory rooms on each of the main floors—sufficient altogether to accommodate two hundred students, besides offering abundant facilities for the private work of the instructors.

The Astronomical Observatory is in the form of the letter T, the stem of which extends toward the south. The equatorial room, surmounted by the dome, is at the intersection of the stem and bar of the T. Besides the equatorial room the Observatory contains four transit rooms, a clock room, a recitation room, a study, and dark rooms for photographic purposes.

University Hall occupies three sides of a quadrangle, measuring 214 feet in front and 122 feet upon the wings. It is devoted almost exclusively to class rooms.

The new *Library Building* is 167 by 113 feet, with a tower 132 feet high. The main floor contains the reference room, the reading room, the conversation room, the Library School lecture room, and the delivery room, which opens into the second story of the book-stack. The second floor contains the Library School class room, four seminary

rooms, and the administrative offices of the University. The basement contains well lighted rooms, which are at present used for various purposes. The book-stack is a rear wing to the building, separated from the rest of it by a fire-proof wall. The stack will eventually contain five stories, and will accommodate 150,000 volumes. At present only three stories are fitted with shelving.

There are, in addition to these buildings, a veterinary hall, four dwellings, three large barns and two greenhouses.

LABORATORIES

SCIENCE LABORATORIES*

The *botanical, geological, physiological, and zoological laboratories* are in Natural History Hall.

The *chemical laboratory* occupies the building of the same name, already described.

The *physical laboratory* is in Engineering Hall. It is provided with piers, a constant temperature room and other conveniences for measurement work.

The *psychological laboratory,* in Natural History Hall, is well provided with apparatus of many different kinds for use in experimental study, research, and instruction.

ENGINEERING LABORATORIES

The *cement laboratory* of the department of civil engineering occupies rooms in Engineering Hall, and is provided with slate tables, testing machines, molding machines, sieves, etc., and sample barrels of hydraulic cement, varieties of sand, and other necessary materials.

The *electrical engineering laboratory* is partly in Engineering Hall and partly in the Mechanical and Electrical Engineering Laboratory.

The *mechanical laboratory* occupies a part of the Wood

*For a more detailed account of these laboratories, see under the appropriate College.

Shops and Testing Laboratory, and each of its departments is equipped for practical work by students.

The *laboratory of applied mechanics* is located in the Wood Shops and Testing Laboratory.

SPECIAL LABORATORIES FOR RESEARCH

The *laboratory of the Agricultural Experiment Station* occupies a part of the basement of Natural History Hall.

The laboratory rooms of the *State Laboratory of Natural History* are in Natural History Hall.

A *Biological Experiment Station* has been established by the University on the Illinois River at Havana, Illinois, and equipped for field and experimental work in aquatic biology. It has its separate staff, but is open to students of the University at all times, on application, and to special students not otherwise connected with the University during the summer months.

A laboratory for *sanitary water analysis* has been equipped with all necessary appliances, and chemical investigation of the water supplies of the state is carried on.

COLLECTIONS*

AGRICULTURAL

A large room in University Hall is devoted to the exhibition of the products of the industrial arts, especially of agriculture. Prominent among the agricultural specimens exhibited is an excellent collection of the sub-species and varieties of Indian corn. There is also a collection of small grains and of grasses; a collection of fibers in various states of manufacture, and a large collection illustrating the forestry of Illinois, Florida, and California. The exhibits made by the University at the Centennial and at the Cotton Exposition at New Orleans find a permanent abode here; large additions have also been made of materials received from the Columbian Exposition of 1893.

*For a more detailed account of the collections in the different departments, see he appropriate subject under each College.

BOTANICAL

The herbarium contains nearly all the species of flowering plants indigenous to Illinois, including a complete set of grasses and sedges. The flora of North America is fairly well represented, and a considerable collection of foreign species has been made. A collection of fungi includes a full set of those most injurious to other plants, causing rusts, smuts, molds, etc. A collection of wood specimens from two hundred species of North American trees well illustrates the varieties of native wood.

Plaster casts represent fruits of many of the leading varieties as well as interesting specimens of morphology, showing peculiarities of growth, effects of cross-fertilization, etc.

ENGINEERING

The following departments of the College of Engineering have made extensive and valuable collections which will be found in rooms in Engineering Hall:

ARCHITECTURE

A large number of specimens of stone, bricks, terra cotta, sanitary fixtures, casts of moldings and of ornament have been accumulated, together with some excellent specimens of industrial arts, models of structures, working drawings of important buildings, 2,500 lantern slides, 20,000 plates and photographs, and the most necessary books.

CIVIL ENGINEERING

The civil engineering department has a large room containing samples of iron, steel, wood, brick, and stone; materials for roads and pavements; models of arches and trusses, one of the latter being full-sized details of an actual modern railroad bridge. The department also possesses a very large collection of photographs and blue-print working drawings of bridges, metal skeleton buildings, masonry structures, and standard railroad construction.

ELECTRICAL ENGINEERING

A number of display boards of wires and cables has been collected, together with carbons, insulators, lighting specialties, signaling devices, primary and secondary cells, rail bonds, and several hundred photographs, blue-prints, and pamphlets descriptive of the best modern practice in electrical engineering.

MECHANICAL ENGINEERING

This department has among other things a partial set of Reuleaux models, together with models of valve gears, sections of steam pumps, injectors, valves, skeleton steam and water gauges, standard packings, steam-pipe coverings, and drop forgings. There are also fine examples of castings, perforated metal, defective boiler plates, and sets of drills, with numerous samples of oil, iron, and steel. A large number of working drawings from leading firms and from the United States Navy Department forms a valuable addition to the above collections.

GEOLOGICAL

Lithology is represented by type collections of rocks (2,900 specimens), arranged to illustrate Rosenbusch, from Voigt and Hochgesang, Dr. L. Eger, and A. Kranz; a type collection from Ward; a large number of ornamental building stones, and a stratigraphic collection to illustrate Illinois geology.

The *mineralogical* collection is especially rich in rock-forming minerals, ores, and materials of economic value. It contains over 7,000 specimens carefully selected to meet the wants of the student.

The *paleontological* collection (43,400 specimens) contains representative fossils from the entire geologic series. It embraces the private collections of Dr. A. H. Worthen, including 650 type specimens; Tyler McWhorter; Rev. Mr. Hertzer; the Ward collection of casts, and a considerable number of special collections representing the fauna and flora of particular groups.

A series of relief maps of noted localities adds greatly to the facilities for illustration.

ZOÖLOGICAL

The *zoölogical* collections have been specially selected and prepared to illustrate the courses of study in natural history, and to present a synoptical view of the zoölogy of the state.

The mounted mammals comprise an unusually large and instructive collection of the ruminants of our country, including male and female moose, elk, bison, deer, antelope, etc., and also several quadrumana, large carnivora and fur-bearing animals, numerous rodents, good representative marsupials, cetaceans, edentates, and monotremes. Fifty species of this class are represented by eighty specimens. All the orders, excepting the Proboscidea, are represented by mounted skeletons. There is also a series of dissections in alcohol, illustrating the comparative anatomy of the group.

The collection of mounted birds includes representatives of all the orders and families of North America, together with a number of characteristic tropical, Bornean, and New Zealand forms. The collection is practically complete for Illinois species. There is also a fine collection of the nests and eggs of Illinois birds. A series of several hundred unmounted skins is available for the practical study of species, and the internal anatomy is shown in alcoholic dissections and in mounted skeletons of all the orders.

The cold-blooded vertebrates are represented by a series of mounted skins of the larger species, both terrestrial and marine; mounted skeletons of typical representatives of the principal groups; alcoholic specimens, both entire and dissected, and casts. The alcoholics include series of the reptiles, amphibians, and fishes, the latter comprising about three hundred species. The dissections illustrate the internal anatomy of the principal groups. The casts represent about seventy-five species, nearly all fishes.

The Mollusca are illustrated by alcoholic specimens of all classes and orders, and dissections showing the internal anatomy of typical forms. There are several thousand shells belonging to seventeen hundred species. The collection of Illinois shells is fair but incomplete.

Of the Arthropoda the entomological cabinet contains about three thousand species (principally American), named, labeled, and systematically arranged. There is also a series of Crustacea, some dried, but mostly in alcohol, the latter including a number of dissections.

The lower invertebrates are represented by several hundred dried specimens and alcoholics, and by a large series of the famous Blaschka glass models.

The embryology of vertebrates and invertebrates is illustrated by a set of Ziegler wax models, and several series of slides, sections, and other preparations.

In addition to the above, the extensive collections of the State Laboratory of Natural History are available for illustrative purposes, as well as for original investigation by advanced students.

ART GALLERY

The University art gallery was the gift of citizens of Champaign and Urbana. It occupies a room in the basement of Library Building, and furnishes an excellent collection of models for students of art. In sculpture it embraces thirteen full-size casts of celebrated statues, forty statues of reduced size and a large number of busts and bas-reliefs, making in all over four hundred pieces. It includes also hundreds of large autotypes, photographs, and fine engravings, representing many of the great masterpieces of painting of nearly all the modern schools, and a gallery of historical portraits, mostly large French lithographs of peculiar fineness, copied from the great national portrait galleries of France.

Other collections of special value to art students embrace a large number of casts of ornament from the Alham-

bra and other Spanish buildings, presented by the Spanish government; a set of casts from Germany, illustrating German Renaissance ornament; a series of art works from the Columbian Exposition; large numbers of miscellaneous casts, models, prints, and drawings, such as are usually found in the best art schools, and a model in plaster and a complete set of drawings of a competitive design by Henry Lord Gay for a monument to be erected in Rome, commemorative of Victor Emanuel, first king of Italy.

LIBRARY

The *library* contains 34,388 volumes and 6,750 pamphlets. The reading room contains 240 periodicals. The library of the State Laboratory of Natural History and that of the Agricultural Experiment Station contain about 7,000 volumes and 16,000 pamphlets. Both these libraries are open to students of the University.

The library and the reading room are open every day except Sunday from 8 a. m. until 5 p. m., and until 9 p. m. on Mondays, Tuesdays, and Thursdays.

ADMISSION

For changes in the requirements for admission on and after September, 1899, see page 43.

Applicants for admission to the freshman class must be at least sixteen years of age, and it is desirable that they be two or three years older than this.

Entrance may be made at any time, provided the candidate is competent to take up the work of the classes then in progress; but it is better to begin upon the first collegiate day in September.

Admission to the freshman class of the University may be obtained in one of three ways: (a) by certificate from a fully accredited high school; (b) by examination; (c) by transfer of credits from some other college or university.

ADMISSION BY CERTIFICATE FROM ACCREDITED HIGH SCHOOLS*

Certain public high schools and a few private preparatory schools have been, after examination, approved by the Faculty of the University, and full graduates of these schools are admitted to the freshman class without examination. Candidates for admission in this way must file with the Registrar upon entrance a certificate of graduation and of preparatory studies. Blanks for these certificates must be obtained from the Registrar in advance, and it is better to forward them to him for approval before registration days.

*For an account of these, see "Accredited High Schools," p. 255.

ADMISSION BY EXAMINATION

Examinations of candidates for admission to the University are held at the University on the Thursday, Friday, and Saturday before the beginning of the fall term in September, and on the two days previous to the opening of each of the other terms. Each candidate must be in attendance during the whole period of the examinations.

The scholarship examinations* held each year on the first Saturday in June and the day preceding, in the several counties of the state, afford an opportunity to pass the entrance examinations before coming to the University, since these examinations are taken as equivalents of the regular entrance examinations.

The subjects upon which the entrance examinations are held are described below.

Text-books are named merely to aid in showing the requirements. Equivalents are accepted.

The examinations which a candidate is required to pass depend in part on which of the four colleges of the University he intends to enter. In the following statement of subjects for examination, those requirements which are common to all the colleges are given first; then follow statements of the additional requirements for each college. To determine on what subjects he must pass examinations, then, a candidate must add to the uniform requirements first stated those classed as additional for the particular college he wishes to enter.

SUBJECTS IN WHICH ALL CANDIDATES FOR ADMISSION MUST BE EXAMINED

For additional requirements for the different colleges, see pages 38, 39, 40.]

1. ALGEBRA.—Fundamental operations, factoring, fractions, simple equations, involution, evolution, radicals, quadratic equations and equations reducible to the quadratic form, surds, theory of exponents, and the analysis and solution of problems involving these. The subject as given in Wells's Higher Algebra through quadratic equations, or the same work in Wentworth's Algebra, or an equivalent.

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*See "Scholarships," p. 244.

2. Composition and Rhetoric.—Correct spelling, capitalization, punctuation, paragraphing, idiom, and definition; the elements of Rhetoric. The candidate will be required to write two paragraphs of about one hundred and fifty words each to test his ability to use the English language. The subject as presented in Genung's Outlines of Rhetoric, Scott and Denney's English Composition, or an equivalent.

3. English Literature.—(a) Each candidate is expected to have read certain assigned literary masterpieces, and will be subjected to such an examination as will determine whether or not he has done so. The books assigned for the next three years are as follows:

1898.—Milton's Paradise Lost, Books I. and II.;Pope's Iliad, Books I. and XXII.; The Sir Roger de Coverley Papers in The Spectator; Goldsmith's The Vicar of Wakefield; Coleridge's Ancient Mariner; Southey's Life of Nelson; Carlyle's Essay on Burns; Lowell's Vision of Sir Launfal; Hawthorne's House of the Seven Gables.

1899.—Dryden's Palamon and Arcite; Pope's Iliad, Books I., VI., XXII., and XXIV.; The Sir Roger de Coverley Papers in the Spectator; Goldsmith's The Vicar of Wakefield; Coleridge's Ancient Mariner; De Quincey's Flight of a Tartar Tribe; Cooper's Last of the Mohicans; Lowell's Vision of Sir Launfal; Hawthorne's House of the Seven Gables.

1900.—Dryden's Palamon and Arcite; Pope's Iliad, Books I., VI., XXII. and XXIV.; The Sir Roger de Coverley Papers in the Spectator; Goldsmith's The Vicar of Wakefield; De Quincey's Flight of a Tartar Tribe; Cooper's Last of the Mohicans; Lowell's Vision of Sir Launfal; Scott's Ivanhoe.

(b) In addition to the above, the candidate will be required to present a brief outline of American Literature. Hawthorne and Lemmon's Outline of American Literature, or an equivalent.

4. Geometry.—Plane Geometry, as given in Wells's or Wentworth's Geometry, or an equivalent. Great importance is attached to the ability of the student to solve original problems.

5. History.—At least one year in one of the following subjects: (a) The History of England and of the United States; (b) General History; (c) The History of Greece and Rome. The statement of requirements in each subject implies the use of a substantial text-book, together with some elementary training in the use of large reference books.

6. Physics.—The elements of physical science as presented in such text-books as Appleton's School Physics, or Avery's Elements of Natural Philosophy, or Carhart and Chute's Elements of Phys-

ics, or Gage's Elements of Physics. The candidate must have had laboratory practice equivalent to that described in the laboratory text-books of Hall and Bergen, Allen, or Chute. The candidate's laboratory note-book will be accepted as part of the examination.

In addition to the preceding subjects, any two of the following:

7. ASTRONOMY.—The subject as given in Young's Elements of Astronomy or Newcomb and Holden's Astronomy for High Schools.

8. BOTANY.—The subject as given in Bergen's Elements of Botany or its equivalent. The text of Gray's School and Field Book of Botany, with such laboratory work, preferably including the use of the compound microscope, as is outlined in the former book, is accepted; but laboratory practice in any case is essential. The ability to determine species and some knowledge of the most important families of flowering plants are required.

9. CHEMISTRY.—Elementary Inorganic Chemistry as presented in Remsen's Elementary Chemistry; Shepard's Elements of Chemistry; Williams's Elementary Chemistry; Storer and Lindsay's Manual of Elementary Chemistry; Armstrong and Norton's Laboratory Manual of Chemistry, or Clark's Elements of Chemistry. Laboratory practice is essential for preparation in this subject. The laboratory note-book must be presented.

10. PHYSIOLOGY.—The anatomy, histology, and physiology of the human body and the essentials of hygiene, taught with the aid of charts, models, and demonstrations upon inferior animals, to the extent given in Martin's Human Body (Briefer Course).

11. ZOÖLOGY.—The subject as taught in the best high schools with laboratory facilities. Mere text-book work will not be accepted. The following will indicate the scope of the work required: Colton's Practical Zoölogy, Parker's Elementary Biology, and Thompson's Outlines of Zoölogy.

ADDITIONAL REQUIREMENTS FOR ADMISSION TO THE COLLEGE OF LITERATURE AND ARTS

[The following, in addition to the requirements on pages 36—38.]

12. ENGLISH LITERATURE.—The candidate will be examined on the form and substance of one or more books in addition to those named under (3), page 37. For 1898, 1899, and 1900 the books will be selected from the lists below. The examination will be of such a character as to require a minute and thorough study of each of the works named, in order to pass it successfully.

1898.—Shakspere's Macbeth; Burke's Speech on Conciliation with America; De Quincey's The Flight of a Tartar Tribe; Tennyson's The Princess.

1899.—Shakspere's Macbeth; Milton's Paradise Lost, Books I. and II.; Burke's Speech on Conciliation with America; Carlyle's Essay on Burns.

1900.—Shakspere's Macbeth; Milton's Paradise Lost, Books I. and II.; Burke's Speech on Conciliation with America; Macaulay's Essays on Milton and Addison; Tennyson's The Princess.

13. LATIN.—Four books of Cæsar's Commentaries, six orations of Cicero, six books of Vergil's Æneid, the scansion of hexameter verse, and Latin composition based on the reading above specified. Increasing importance is placed on ability to write Latin and on a knowledge of the quantity of the vowels. Candidates are urged to make special preparation in these directions. It is recommended that not more than two books of Cæsar be read, and that other authors be substituted for the books omitted. Equivalents for any of the above requirements will be accepted. Allen and Greenough's, Bennett's, or Harkness's Latin Grammar is recommended and Collar's or Daniell's Latin Prose Composition. The Roman pronunciation is used. Frequent oral reading throughout the whole of the preparatory course is especially urged.

Students desiring to pursue Greek in the University must have also the following, which will be accepted instead of the three sciences OTHERWISE *required:*

14. GREEK.—Grammar, a thorough knowledge of forms and syntax; an amount of prose composition equal to that given in Woodruff's Greek Prose Composition; the first three books of Homer's Iliad, except lines 494-759 of Book II.; three books of Xenophon's Anabasis or an equal amount of text from some other classic prose author.

Teachers preparing students for the freshman class are particularly requested to lay stress upon a knowledge of the forms of the language, and to give pupils practice in impromptu translation of easy prose.

ADDITIONAL REQUIREMENTS FOR ADMISSION TO THE COLLEGE OF ENGINEERING

[The following, in addition to the requirements stated on pages 36—38.]

15. FREE-HAND DRAWING.—Ten hours a week for one term, or the equivalent thereof. The nature of the work is indicated by Cross's Free-hand Drawing.

16. GEOMETRY.—Solid and spherical geometry as given in Wells's or Wentworth's Plane and Solid Geometry, or an equivalent.

One of the following:

17. FRENCH.—Elements of grammar, tested by the translation of simple French prose at sight. At least one year's work. Chardenal's Complete French Course, or an equivalent, and about three hundred pages of easy prose.

18. GERMAN.—Elements of grammar, tested by the translation of easy German prose. At least one year's work. Joynes-Meissner's German Grammar, Joynes' German Reader, or equivalents, and 100 pages of easy prose.

19. LATIN.—Elements of grammar, tested by the translation of easy Latin prose. At least one year's work. Allen and Greenough's Grammar and Viri Romae, or an equivalent.

ADDITIONAL REQUIREMENTS FOR ADMISSION TO THE COLLEGE OF SCIENCE

[The following, in addition to the requirements stated on pages 36—38.]

16. GEOMETRY.—Solid and spherical geometry as given in Wells's or Wentworth's Plane and Solid Geometry, or an equivalent.

One of the following:

17. FRENCH.—Elements of grammar, tested by the anslation of simple French prose at sight. At least one year's work. Chardenal's Complete French Course, or an equivalent, and about 300 pages of easy prose.

18. GERMAN.—Elements of grammar, tested by the translation of easy German prose. At least one year's work. Joynes-Meissner's German Grammar, Joynes' German Reader, or equivalents, and about 100 pages of easy prose.

19. LATIN.—Elements of grammar, tested by the translation of easy Latin prose. At least one year's work. Allen and Greenough's Grammar and Viri Romae, or an equivalent.

ADDITIONAL REQUIREMENT FOR THE COLLEGE OF AGRICULTURE

[The following, in addition to the requirements stated on pages 36—38.]

16. GEOMETRY.—Solid and spherical geometry, as given in Wells's or Wentworth's Plane and Solid Geometry, or an equivalent.

PROGRAM OF EXAMINATIONS, SEPTEMBER 8-13, 1898

All persons who wish to enter the University at the opening of the fall term, 1898, except those holding certificates of graduation from accredited schools and scholarship certificates, and those for whom a transfer of all entrance credits from some other college or university has already been approved, must present themselves at the Registrar's office, Library Hall, at 9 o'clock a. m., Thursday, September 8th. At that time applications for admission will be received, and applicants will be given all necessary directions as to examinations.

The program of examinations is as follows:

History	Thursday	1:00 p.m.
Physics	Thursday	3:00 p.m.
Algebra	Friday	8:00 a.m.
Physiology	Friday	1:00 p.m.
Botany	Friday	3:00 p.m.
Geometry	Saturday	8:00 a.m.
Zoölogy	Saturday	1:00 p.m.
German	Saturday	3:00 p.m.
English Literature and Composition	Monday	8:00 a.m.
French	Monday	1:00 p.m.
Chemistry	Monday	3:00 p.m.
Latin	Tuesday	8:00 a.m.
Free-hand Drawing	Tuesday	9:00 a.m.
Astronomy	Tuesday	1:00 p.m.
Greek	Tuesday	3:00 p.m.

ADMISSION BY TRANSFER FROM OTHER COLLEGES AND UNIVERSITIES

A person who has entered another college or university of recognized standing will be admitted to this University upon his presenting a certificate of honorable dismissal from the institution from which he comes and an official statement of the subjects upon which he was admitted to such institution, provided it appears that the subjects are those required here for admission by examination, or real equivalents. Candidates, to enter the University in this way, should submit such papers to the Registrar before the time of entrance, so that all doubtful points may be cleared up in advance.

ADMISSION AS SPECIAL STUDENTS

Persons over twenty-one years of age, not candidates for a degree, may be admitted to classes, after satisfying the President and the professor in charge of the department in which such classes are taught, that they possess the requisite information and ability to pursue profitably, as special students, the chosen subjects. Such students are not matriculated; they pay a tuition fee of five dollars a term, in addition to the regular incidental fee of seven dollars and a half.

ADMISSION TO ADVANCED STANDING

After satisfying in some of the ways already enumerated all the entrance requirements for admission to the freshman class of the college which he wishes to enter, the applicant for advanced standing may secure such standing either by examination or by transfer of credits from some other college or university.

1. *By Examination.*—Candidates for advanced standing, not from other colleges or universities, may secure such standing on examination. In the case of freshman students seeking advanced standing on the basis of their preparatory work, such standing shall be granted after satisfactory examination only, unless the applicants are from fully accredited schools. In that case a transfer of credits may be made as provided below.

2. *By Transfer of Credits.*—Credits from other colleges or universities may be accepted by the Faculty for advanced standing; but at least one year's work in residence at the University is required of all candidates for a bachelor's degree.

In all cases, a certificate of honorable dismissal is required, together with a certified record of work done in the institution from which the applicant comes. These should be presented for approval some time before the student enters for work.

Upon approval of the Faculty freshmen may receive credit for advanced work done in fully accredited high schools.

CONDITIONS OF ADMISSION ON AND AFTER SEPTEMBER, 1899

In September, 1899, and thereafter, the requirements for admission to the freshman class of the University will be as follows:

In all cases 36 credits will be required, the term credit meaning the work in one subject continuously pursued, with daily recitations, through one of the three terms of the high school year; or, in other words, the work of sixty recitation periods of forty minutes each, or the equivalent in laboratory, or other, practice. Of these 36 credits, 28 must be obtained by all candidates in the subjects, and according to the valuation, stated in the first list given below. The remainder of the 36 may be made up by offerings in any of the subjects in the elective list given below, with the following restrictions and provisions:

1. No offering will be accepted in any one of these elective subjects unless at least equal in quantity to the minimum specified in the table. For example: Astronomy is listed for from 1 to 1½ credits. Nothing less than one term's work, that is, one credit, will be accepted, therefore, in that subject.

2. Those who wish to enter upon the courses leading to the degree of bachelor of arts must choose from among the electives at least one foreign language in addition to the language chosen from among the prescribed subjects in the first list. The language from the elective list may or may not be the same as that offered in the prescribed list. Those who wish to pursue the study of Latin or Greek in the University must, however, offer nine credits in Latin or six in Greek, respectively.

3. Those who wish to enter upon the courses leading to the degree of bachelor of science, in any line of study except agriculture, must offer solid and spherical geometry among their electives.

4. For entrance upon the agricultural courses leading to the degree of bachelor of science any six credits from

the elective list will be accepted instead of the six credits in foreign language. But at least two years of foreign language study in the University must be taken by those who make this option.

The amount of work in each subject which, in the judgment of the University authorities, corresponds to the minimum number of credits assigned is shown by the description of the amount of work required in each subject, on pages 36 to 40, and 45 to 47.

The prescribed subjects, with the number of credits allowed for each, are as follows:

Algebra	4 credits.
English Composition	3 credits.
English Literature	6 credits.
French, or German, or Greek, or Latin	6 credits.
Plane Geometry	3 credits.
History	3 credits.
Physical or Biological Science	3 credits.

The subjects in the elective list, with the minimum and maximum number of credits allowed for each, are as follows:

Astronomy	1 to 1½ credits.
Botany	1½ to 3 credits.
Civics	1 to 3 credits.
Biology	3 to 6 credits.
Drawing	1 to 3 credits.
Chemistry	2 to 3 credits.
French	3 to 9 credits.
Geology	2 to 3 credits.
Geometry, Solid and Spherical	1 credit.
German	3 to 9 credits.
Greek	3 to 7 credits.
History	3 credits.
Latin	3 to 12 credits.
Manual Training	1 to 2 credits.
Physics	3 credits.
Physiography	1½ to 3 credits.
Physiology	1 to 3 credits.
Zoölogy	1½ to 3 credits.

The following is a description of the amount of work required for the minimum number of credits assigned to the corresponding subjects in the list of electives:

Biology.—The subject as taught in good high schools with laboratory equipment. For the minimum number of credits, one year's work upon such types as are presented in Huxley and Martin's Practical Biology, or Parker's Elementary Biology. For further credits, advanced laboratory work and field collections. Notebooks, drawings, collections of specimens, etc., showing work done, must be presented.

Civics.—The amount of study on the United States Constitution, its history and interpretation, such as is given in text-books like Young's Civil Government or Townsend's Civil Government, is regarded as sufficient for one term. The work may advantageously be combined with the elements of political economy, as given, for example, in Walker's, or Meservey's, or Thompson's Political Economy, or in Ely's "Introduction."

Drawing.—Free-hand or mathematical drawing, or both. Drawing books or plates must be submitted. The number of credits allowed will depend upon the quantity and quality of the work submitted.

French.—*One year's work.*—A thorough knowledge of elementary grammar and the irregular verbs. Correct pronunciation; the ability to translate simple spoken French phrases and to translate at sight ordinary French prose. Reading of some 300 pages of easy prose, including one modern comedy.

Two years' work.—In addition to the above, proficiency in advanced grammar and the essentials of syntax. Elementary composition. Reading of not less than 400 pages of standard authors, including two plays of Molière. Memorizing not less than six fables or anecdotes.

Geology.—Familiarity with the matter found in Scott's Introduction to Geology, published by Macmillan, or a real equivalent. The student must be able to recognize well marked types of cystalline and fragmental rocks, and to explain the origin of the topography of the region in which he lives. Additional laboratory and field work will be given such credit as it merits.

German.—*One year's work.*—Elementary grammar, especially declension of articles and ordinary nouns and pronouns, use of the strong and the weak adjective, the two conjugations of verbs, with the principal parts and meanings of all the strong verbs, separable and inseparable prefixes, the use of common prepositions, the inverted and transposed sentence order. Practice in writing German sentences should accompany this work throughout the course,

but the German script is not insisted upon. Besides the work in grammar the student should read not less than 150 pages of easy narrative or descriptive prose, giving careful attention to its translation into good idiomatic English.

GERMAN.—*Two years' work.*—In addition to the work outlined under the one year requirement, the pupil should know the syntax of cases, uses of the subjunctive and infinitive, complex sentence structure, uses of modal auxiliaries and of participial constructions. The translation into German of about thirty-five pages of narrative prose should insure ready application of grammatical principles. As an additional reading requirement, from 250 to 300 pages, including one of Schiller's historical dramas and about 30 pages of German lyrics, should be translated. Constant practice in reading German should secure an accurate pronunciation and a feeling of the rhythm and rhetorical form of the works studied.

GERMAN.—*Three years' work.*—The third year's study should aim to secure an easy reading knowledge of the language. Accurate and idiomatic translations into English, constant practice in sight translation and in writing from dictation should be insisted upon. Standard prose of the grade represented by Heine, Freytag, or Dahn, not less than 100 pages should be read, together with selections from classic poetry. Lessing's Minna von Barnhelm and Goethe's Egmont or Iphigenie auf Tauris are especially recommended. Additional work in prose composition, or in the writing of paraphrases of the texts read, should insure the ability to write simple German.

LATIN.—*One year's work, 3 credits; two years' work, 6 credits; three years' work, 9 credits.*—A student coming from a school having a four years' course in Latin, the full equivalent of the work described on p. 39, will be given 3, 6, and 9 credits, respectively, for one, two, and three years of such course.

A student coming from a school having a three years' course in Latin comprising in addition to the usual grammar study and prose composition, the reading of not less in amount than three books of Cæsar, three orations of Cicero, and two books of Vergil with scansion, or equivalents, shall also be given 3, 6, and 9 credits, respectively, for one, two, and three years of such course.

ZOÖLOGY.—Field, laboratory and text-book work to the amount of a half year in the high school. Colton's Practical Zoölogy, the zoölogical part of Huxley and Martin's Practical Biology, or of Parker's Elementary Biology will satisfy the laboratory require-

ments. Thomson's Outlines of Zoölogy, or its equivalent, will be accepted as a suitable text.

Physiography.—The amount and character of the work required for the minimum credit may be seen by referring to Mill's Reader of Nature, published by Scribner.

For additional credits the principles of climatology, ability to read physical and contour maps, interpretation of weather maps and forecasting of weather, etc., will be considered.

Physical or Biological Science.—For this there may be offered any one of the following subjects or combination of subjects: Physics, one year; chemistry, one year; botany and zoölogy, each a half year; biology, the study of plant or animal types, one year.

The subjects must be taught in part by laboratory methods and the pupil's note-books must be submitted. Other evidences of work done, as illustrative drawings, collections of specimens, etc., should be presented. Examinations cover the subject-matter as presented in text-books in most common use in high schools. See also the descriptions given under the several subjects.

REGISTRATION

At the beginning of each term each student must present himself for registration within the time set for that purpose, before the formation of classes, and he must be present at the first exercise of each class he is to attend.

EXAMINATIONS

Examinations are held as often as in the judgment of the instructor the necessities of the work require. Examinations are also given at the close of each term, on the work of the term, in all subjects except those whose character renders it unnecessary or impracticable. Students who are conditioned in term examinations are required to take second examinations soon after the beginning of the following term. Those who fail to pass the term examination are precluded from proceeding with any University work without special permission.

A record is kept of each student's standing.

TERMS AND VACATIONS

The University year is divided into three terms. The first covers fourteen weeks of instruction and each of the others eleven. There is a vacation of two weeks at the end of the first term, and of one week at the end of the second. For the dates of opening and closing, see the "Calendar."

GRADUATION

In all cases 40 credits are required for graduation. For men two of these must be obtained in military and physical training. For women two of these may be obtained in physical training. In order to graduate, a student in any course must complete all of the subjects prescribed for graduation and make up the rest of his 40 credits by means of electives. The combinations of studies under which a student may graduate are too numerous to describe here. They are given under the separate colleges and schools. The courses offered in the College of Engineering are nearly all prescribed, so that a student who is working for a degree cannot be permitted to deviate from them.

ADMINISTRATION OF THE UNIVERSITY

GOVERNMENT

The government of the University is vested by the Trustees primarily in the President of the University, in the Faculty, in the Council of Administration, and in the Deans. The President is the executive head of the University.

The Dean of the General Faculty has general oversight of the instructional work of the University, and especial supervision of the graduate school. By order of the Board of Trustees he also fills the office of Vice-President.

The Dean of each college is responsible for the enforcement of all University regulations within his college.

The Council of Administration is composed of the President, the Dean of the General Faculty, the Dean of the Woman's Department and the Deans of the separate colleges. It constitutes an advisory board to the President, *and has exclusive jurisdiction over all matters of discipline.*

The Council does not exercise general legislative functions, but when any matter arises which has not been provided for by rule or common usage or legislative action by the General Faculty, and which cannot be conveniently laid over till the next meeting of the General Faculty, the Council may act upon the same according to its discretion, and its action in such cases is not subject to reversal by the General Faculty.

The determination of the general internal policy of the University is in charge of the Faculty.

The faculties of the different colleges and schools of the University are composed of the members of the corps

of instruction of these colleges and schools, and have jurisdiction over all matters which pertain exclusively to these organizations, subject always to higher University authority.

ORGANIZATION

For the purpose of more efficient administration, the University is divided into several colleges and schools. This division does not imply that the colleges and schools are educationally distinct. They are interdependent and together form a unit. In addition to the courses mentioned as given in each college and school, instruction in military science and physical training is provided. The organization is as follows:

I. The College of Literature and Arts.
II. The College of Engineering.
III. The College of Science.
IV. The College of Agriculture.
V. The Graduate School.
VI. The School of Library Science.
VII. The School of Music.
VIII. The School of Law.
IX. The School of Medicine.
X. The School of Pharmacy.

THE COLLEGE OF LITERATURE AND ARTS

The College of Literature and Arts offers—

1. General courses, classified according to the principal line of work chosen.

2. Specialized courses, or courses under the group system, including—

a. The Classical Group.
b. The English Group.
c. The German and Romance Language Group.
d. The Latin and Modern Language Group.
e. The Philosophical Group.
f. The Political Science Group.

THE COLLEGE OF ENGINEERING

The College of Engineering offers courses—

1. In Architecture.
2. In Architectural Engineering.
3. In Civil Engineering.
4. In Electrical Engineering.
5. In Mechanical Engineering.
6. In Municipal and Sanitary Engineering.

THE COLLEGE OF SCIENCE

The College of Science offers courses arranged in four groups, as follows—

1. The Chemical and Physical Group.
2. The Mathematical Group.
3. The Natural Science Group.
4. The Philosophical Group.

THE COLLEGE OF AGRICULTURE

The College of Agriculture offers—

1. A course leading to Animal Husbandry as a specialty.
2. A course leading to Horticulture as a specialty.
3. A term's work, running through the winter term, offered to students not otherwise enrolled.

THE GRADUATE SCHOOL

The Graduate School offers courses in—

1. Agriculture.
2. Engineering.
3. Literature, Philosophy, and the Arts.
4. The Sciences.

An enumeration of the departments of graduate study is given at the beginning of "General Description of Courses," and the separate graduate courses offered are described in connection with the proper subjects in the list of courses which there follows.

THE SCHOOL OF LIBRARY SCIENCE

The School of Library Science, or the State Library School, offers a course of study, extending over four years, in preparation for the practice of the work of a librarian. The course leads to the degree of bachelor of library science.

THE SCHOOL OF MUSIC

The School of Music offers courses in vocal and instrumental music, leading to the degree of bachelor of music.

THE LAW SCHOOL

The Law School offers a course of study leading to the degree of bachelor of laws.

THE SCHOOL OF MEDICINE

The School of Medicine offers a course of study leading to the degree of M. D.

THE SCHOOL OF PHARMACY

The School of Pharmacy offers a course in all branches necessary to a complete scientific and practical knowledge of pharmacy, including pharmacy, chemistry, materia medica, botany, physics, and physiology. The course leads to the degree of graduate in pharmacy or to that of pharmaceutical chemist.

COLLEGE OF LITERATURE AND ARTS

FACULTY

Andrew S. Draper, LL.D., President.
David Kinley, Ph.D., Dean, Economics.
Thomas J. Burrill, Ph.D., LL.D., Botany.
Samuel W. Shattuck, C.E., Mathematics.
Charles W. Rolfe, M.S., Geology.
Arthur W. Palmer, Sc.D., Chemistry.
Frank F. Frederick, Art and Design.
Herbert J. Barton, A.M., Latin.
Charles M. Moss, Ph.D., Greek.
Daniel K. Dodge, Ph.D., English.
Daniel H. Brush, Captain 17th Infantry, U.S.A., Military Science.
Arnold Tompkins, Ph.D., Pedagogy.
Albert P. Carman, Sc.D., Physics.
Evarts B. Greene, Ph.D., History.
George T. Kemp, M.D., Ph.D., Physiology.
George W. Myers, Ph.D., Astronomy.
Edgar J Townsend, Ph.M., Mathematics.
Henry H. Everett, Physical Training.
Lewis A. Rhoades, Ph.D., German.
Harry S. Grindley, Sc.D., Chemistry.
T. Arkle Clark, B.L., Rhetoric.
Herman S Piatt, Ph.D., Romance Languages.
Arthur H. Daniels, Ph.D., Philosophy.
George D. Fairfield, A.M., Romance Languages.
Charles W. Tooke, A.M., Secretary, Public Law and Administration.
Frank Smith, A.M., Zoölogy.

John E. McGilvrey, A.B., Pedagogy.
Violet D. Jayne, A.M., English.
Alton C. Burnham, B.S., Mathematics.
Edward J. Lake, B.S., Art and Design.
Ella H. Morrison, Physical Training for Women.
George A. Huff, Jr., Coach of Athletic Teams.
Agnes S. Cook, A.B., Rhetoric.
A. C. Howland, Ph.D., History.
Chester H. Rowell, Ph.B., German.
George H. Meyer, A.M., German.
John P. Hylan, Ph.D., Psychology.
Charles F. Hottes, M.S., Botany.
George D. Hubbard, B.S., Geology.
Matthew B. Hammond, Ph.D., Economics and Sociology.
David H. Carnahan, A.B., Fellow, French.
Albert St. J. Williamson, Military Science.

AIMS AND SCOPE

The College of Literature and Arts includes those branches usually comprised in a department of philosophy and arts, with the exception of the natural sciences. The aim of the College is a double one: to furnish a liberal education, and to afford the largest opportunity for specialization in literary and philosophical subjects. It is believed that this double purpose can be best accomplished by a judicious combination of disciplinary and information studies, which, while so directing the work of the student as to secure the desired mental training, shall also allow him large liberty of choice both in his main lines of work and in subjects auxiliary thereto.

In accordance with this general plan, it is provided that students may graduate either under the general course system or under the specialized course, or group, system.

THE GENERAL COURSE SYSTEM

A general course is one in which less than three years' work in any one subject, or group of allied subjects, is required for graduation, and in which no thesis is required.

In the general courses a minimum of prescribed work is laid out for the first two years. The whole of the work of the first year, and part of that of the second, is prescribed. The work for the rest of the course is elective. Within the limits of the prescribed work, however, the student is permitted a choice of lines of work.

In choosing his electives, each student must select at least two subjects from the major electives.

In the choice of his electives other than his major work the student may take a minimum of work in a maximum number of subjects, or he may take a maximum amount of work in the minimum number of subjects necessary to fill up his time according to the rules of the University.

The elective courses open to the students of the College include subjects from the Colleges of Science and Engineering. The sciences are not an integral part of the work of the College, but the training derived from their study is so important a part of a liberal education that every student of the College is earnestly advised to extend his study of them so far as may be.

THE SPECIALIZED COURSE, OR GROUP, SYSTEM

A specialized, or group, course is one which contains at least two years of major work in a single subject preceding the senior year, followed by an additional year of major work in that subject, and the writing of an acceptable thesis. No student may be enrolled in a specialized course without the permission of the head of the department in which he wishes to do his principal work, and each student who wishes to be so enrolled must specify the course he desires to enter not later than the beginning of his junior year.

In the specialized course, or group, system the prescribed work is the same as in the general course system. The other credits necessary for graduation are to be obtained in the subjects of the group which the student enters. (See requirements for graduation, below.)

Only those students who pursue a specialized course shall, as a rule, be selected from this College for fellowships, scholarships, and other similar University honors.

The groups are as follows:

The *Classical Group*, including Greek and Latin as the major subjects. One of these languages must be taken for nine, the other for six, terms.

The *English Group*, including the Scandinavian languages. Students in this group must take two years of French or German before the beginning of the junior year. Those electing the course in language must have at least two years of German.

The *German and Romance Language Group*. Either German or French may be taken as a major, but as a condition of graduation six credits in the other must be secured. Besides the required work in English, all students must elect additional English sufficient to make a total of at least three credits. Students of marked ability, taking French as a major, will be advised to take the courses offered in Spanish or Italian.

The *Latin and Modern Language Group*, including Latin as a major and German and French as minors. Six credits in one minor are required.

The *Philosophical Group*, including pedagogy, philosophy, psychology, and mathematics as major subjects. In this group the second year of the student's work is devoted to studies specifically preparatory to the principal subject, which is itself taken up at the beginning of the third year.

Students in this group who make philosophy a major must, in the second year, make three full term-credits from among these subjects: Anthropology, psychology, economics 6 (sociology), Greek 5.

Those who make psychology their major subject must, in their second year, make three full term-credits from among these subjects: Botany 1b, c; economics 6; philosophy 1, 6, 9, 10; physiology 4; zoölogy 3.

When pedagogy is the major, three second year credits

must be obtained in logic (philosophy 8) and two terms of psychology.

Those students who make mathematics their major work must take the following courses in mathematics—2, 4, 6, 7, 8, 9, 10, 11, 15, 16, 17, and may elect as many more courses as desired. They must also make three credits in philosophy (including philosophy 8), and either 6 credits in German or 3 credits in French.

The *Political Science Group*, including economics, history, and public law and administration. All students in this group must take the three elementary courses: History 1, economics 1, a and b, and political science 1; and must also secure at least one credit in philosophy, selected from courses 1, 2, 3, 4, and 8. All students in the group must, before the beginning of the junior year, have taken one year's work in either French or German, or must give other satisfactory evidence of their ability to use at least one of these languages.

REQUIREMENTS FOR GRADUATION

UNDER THE GENERAL COURSE SYSTEM

Forty full term-credits, including military and physical training, are required for graduation under the general course system. Every student must take the prescribed subjects; in addition, he must select at least two subjects from the list of major electives, and he must then choose work sufficient to yield him the remainder of his necessary credits.

No credits will be granted in any subject except according to the enumeration given. For example, if work is offered in a subject for from three to six credits, no credit will be allowed for less than three terms' work.

UNDER THE SPECIALIZED COURSE, OR GROUP, SYSTEM

Forty full term-credits, including military and physical training, together with an acceptable thesis, are required for graduation under the group system. Every student must take the prescribed subjects. In addition he must,

not later than the beginning of his junior year, specify the group in which he wishes to graduate. He must at this time select one subject in the group as his major subject, the study of which, alone or with the subjects designated as specifically preparatory* to it, he must pursue during the remaining two years, securing therein at least nine full term-credits. He must also select, with the approval of the head of the department in which his major subject lies, a sufficient number of other studies to yield him the necessary complement of credits, and he must present an acceptable thesis.

The thesis required for graduation must be on a topic connected with the student's major study. It must present the results of investigation made under the immediate supervision of the instructor during the last year of the student's course. This work of investigation shall be the required work in the major subject, in whole or in part, during that year, and shall receive credit like any other study. Separate credit will not be given for the thesis.

No credit will be allowed in any subject except according to the enumeration given, and the same work shall not be credited both as major and minor work.

The only degree given in this College is that of A. B.

The prescribed studies must be taken in the term and year indicated in the outline of courses by years and terms.

CLASSIFICATION OF SUBJECTS

PRESCRIBED

Advanced Algebra (Math. 1, 2); 1 or 1⅖ credits.

English 1; 1⅕ credits.

French 1, German 1 and 8, Greek 1, 2, 3, or Latin 1, 2, 3; 3 credits.

Geometry, Solid and Spherical (Math. 19); 1 credit.

History 1; 1⅘ credits.

Logic (Philosophy 8); 1 credit.

Military 1, 2, and Physical Training 1; 2 credits.

*See page 56.

Natural Science; 3 credits.
Rhetoric 1; 2 credits.
Trigonometry (Math. 3, 4); 1 or 3/5 credit.

ELECTIVE

MAJOR COURSES

Economics 1 to 18, 101, 102; 6 to 17 4/5 credits.
English 1 to 14; 6 to 21 3/5 credits.
French 1 to 4; 6 to 12 credits.
German 1 to 4, 8 and 9; 6 to 16 credits.
Greek 1 to 9; 6 to 9 credits.
History 1 to 12; 6 to 15 3/5 credits.
Latin 1 to 10; 6 to 10 credits.
Mathematics 1 to 24; 6 to 18 credits.
Pedagogy 1 to 6; 6 credits.
Philosophy 1 to 7, 9; 6 credits.
Public Law and Administration 1 to 9; 6 to 9 2/5 credits.
Psychology 1 to 4, 8, 101; 6 to 9 1/5 credits.
Rhetoric 1 to 4; 6 credits.

MINOR COURSES

The necessary number of credits additional to those provided for in the prescribed subjects and the required two major electives may be secured from any of the subjects offered in the College of Literature and Arts, or in the College of Science, the requirements for which the student can meet. Not more than six credits may be counted in art and design, nor more than two in physical training for women. Course 13 of library science may be taken as a minor.

COURSE OF INSTRUCTION BY YEARS AND TERMS

All the prescribed subjects must be *finished by the end of the sophomore year*. The following statement gives the years and terms in which they occur.

FIRST YEAR

1. Advanced Algebra and Trigonometry (Math. 2, 4); French 1, German 1, Greek 1, or Latin 1; Military 1, 2; Natural Science: Chemistry 1; Zoölogy 10, 11; Physical Training 1; Rhetoric 1.

2. Advanced Algebra and Trigonometry (Math. 2, 3); French 1, German 1, Greek 2, or Latin 2; Military 1, 2; Natural Science; Chemistry 2, 3a; Geology 4; Zoölogy 1, 2, 3; Physical Training 1; Rhetoric 1.

3. French 1, German 8, Greek 3, or Latin 3; Geometry, Solid (Math. 19); Military 2; Natural Science: Astronomy 4a; Botany 6; Chemistry 2, 3b, 4, 20; Zoölogy 1, 2, 8; Physical Training 1; Rhetoric 1.

SECOND YEAR

1. English 1; History 1; Natural Science: Astronomy 4b; Botany 1; Chemistry 1; Physics 1 and 3; Zoölogy 1, 3, 10, 11; Military 2; Electives.

2. English 1; History 1; Natural Science: Botany 1; Chemistry 2, 3a; Geology 4; Physiology 4; Zoölogy 1, 2, 3; Military 2; Electives.

3. English 1; History 1; Logic (Philos. 8); Natural Science: Astronomy 4a; Botany 1, 6; Chemistry 2, 3b, 4, 20; Physiology 5; Zoölogy 1, 2, 8; Military 2; Electives.

The studies of the third and fourth years are all elective.

DESCRIPTION OF DEPARTMENTS

ART AND DESIGN

This work subserves a threefold purpose: (1) It affords students the opportunity to acquire such a knowledge of free-hand drawing as their chosen courses may require. (2) It offers such as have a talent for art the best facilities for pursuing studies in all branches of fine art. (3) It offers those who wish to become teachers of drawing special opportunities for study.

Special students, not otherwise connected with the University, may enter this department upon payment of moderate fees. For such students a fourth year of work is offered in drawing, painting, modeling, or design, as they may elect.

ECONOMICS

The work in economics for undergraduates is so arranged that the student can take a continuous course for from one to three years. The introductory courses are repeated each year, and the advanced courses are divided

into two groups and given in alternate years. The courses are designed to cover as large a field as possible in the literature of the subject, and to present all disputed matters from different points of view.

Minor courses in sociology are provided for in the department.

ENGLISH LANGUAGE AND LITERATURE

The courses are designed to give a continuous view of the twofold subject from the earliest times to our own day. In the junior and senior years double courses are offered, so that students, having had the fundamental work of the sophomore year, may, if desired, confine themselves either to philology or to literature. The aim in the study of literature is to approach the works of an author from the philosophical, emotional, and esthetic, as well as from the merely linguistic and historical points of view.

FRENCH

(See Romance Languages, p. 66.)

GERMAN

Four years of instruction are offered in this subject. By alternating the work in the third and fourth years, provision is made that students whose knowledge of the language at entrance enables them to begin with the third year's work can pursue the subject throughout their course. The work of the first and second years is intended to give the student the best possible reading knowledge. In the second year an opportunity is offered those whose special interest in the language is as a tool in scientific or technical studies to read scientific works during the winter and spring terms; but ability to translate readily and accurately is, in all cases, especially emphasized.

The work of the third and fourth years consists of a critical study of the classic poets and modern writers, and of lectures in German literature.

GREEK

The general purpose of the courses laid out in this subject are: first, to teach the Greek language; second, to train students to appreciate its literature; and third, to call attention to those numerous problems in the history, thought, and institutions of the Greeks which illustrate similar phenomena noticeable among ourselves. To accomplish the first object, due attention is paid to the principles of grammar, particularly by making the syntax appear as the evidence of orderly mental procedure, and by continual practice in extemporaneous translation. The second is effected by a study of the surroundings and spirit of an author, and of those literary devices which give character to his productions. The third end is reached through familiar talks upon suitable topics as they are met.

HISTORY

The work of this department begins with an elementary course, prescribed for sophomores, in the history of mediæval and modern Europe. The advanced undergraduate work falls into two main divisions, mediæval history and modern history. The seminary courses are designed for graduates and for seniors of high standing who have had the requisite preliminary training.

Throughout the courses the effort is made not merely to give students a general knowledge of historical facts, but also to give them some conception of the aims and methods of historical science, and of the materials with which it deals. To this end exercises in historical investigation, more or less elementary, will form a prominent part of the work in all the higher undergraduate courses, as well as in the seminaries.

ITALIAN

(See Romance Languages, p. 66.)

LATIN

The courses at present offered in Latin are ten in number and extend over three years. The first term's instruc-

tion is, as far as needed, grammatical, prominence being given to Latin writing as the best method of acquiring a mastery of the language.

As soon as this preliminary work is done, the attention is directed to two ends. The first is the acquisition of power to read the language with ease and pleasure. The thought is constantly emphasized that students are not simply reading Latin—they are reading some of the great literary masterpieces of the world, and should enjoy them as such. The second aim is to introduce the student to the daily life of the Roman; to make his home life vivid, his political life a reality. The contribution of the Roman world to the language, literature, and institutions of our time is so great that an intimate acquaintance with that life is of the highest educational value.

The courses offered include a teachers' class, the work of which is based on the needs of those teaching preparatory Latin, and methods of presentation, difficulties, aims, and results are discussed. The members of the class do the work which they, as teachers, should require of their pupils, and at intervals take charge of the recitation.

MATHEMATICS

The object of the instruction in pure mathematics is to promote habits of mental concentration and continuity of thought, to develop the capacity to form and combine abstract conceptions, and to cultivate deductive reasoning. The course is so arranged as to meet the requirements of those who wish to fit themselves for teaching, and of those who study the science for the love of it.

The mathematical courses, open to students of the College of Literature and Arts, include the entire offering of the University in pure mathematics.

MILITARY SCIENCE

The work of the department of military science is prescribed for all male students. The department therefore belongs to all the colleges alike. A full description of the

work offered and of the aims and scope of the department will be found farther on in the catalogue.

PEDAGOGY

The work of the department of pedagogy is designed for those who desire a more thorough and philosophic knowledge of the principles and practice of teaching than can be gained from the other means of professional preparation furnished by the state. It seeks to give a comprehensive insight into school education, its phases, and problems; and thus to be of special service to those who may hold positions in school work. The course is elastic, and, in so far as possible, will be adjusted to suit the needs of the students who take the work.

PHILOSOPHY

The work in this department includes history of philosophy, metaphysics, ethics, and logic, and is so arranged that the student may take a continuous course for either one or two years.

The courses are planned to meet the needs of those who make philosophy their specialty, and also of those who desire an acquaintance with the subject as a means of general culture. It is the constant aim to emphasize the meaning and interest of philosophy and the relations of its problems to the life of man.

PHYSICAL TRAINING

The work of this department is offered to all students in the University. Consequently the department properly belongs in all the colleges. A full description of its aim and scope is given farther on.

PUBLIC LAW AND ADMINISTRATION

The courses in public law and administration are planned with two purposes in view: (1) to give, in conjunction with the instruction in economics and history, that information and training which are requisite to intelligent citizenship; and (2) to afford opportunities for advanced work

to those who may desire more thorough preparation, either for active political life or preliminary to the study of law.

To meet these ends, the work is so arranged that the subject may be pursued continuously for three years. The elementary courses are given every year, while the advanced courses are offered in alternate years.

The courses, as a whole, are intended to cover the theory of the state, its organization, and practical operation.

PSYCHOLOGY

Besides the opportunity offered in this department for scientific training and original research, there is also given a basis for general culture. The student is taught to observe psychic phenomena in himself and in his social surroundings, both individual and collective, and is thus given a standpoint from which to approach intelligently the social and ethical questions which may confront him.

The development of mind is traced from its beginnings at the bottom of the animal scale, and correlated, so far as possible, with the evolution of nervous structure. The unfolding of the child's mind is carefully followed from the first days of infancy and traced to the end of adolescence. So far as practicable, the relation of mind to matter and the meaning and value of consciousness as a biological factor are given a place in this scheme.

Historically, psychology is treated with a view to giving the student a connected idea of the development of the subject. Its experimental development and recent phases are given special attention, with particular comment upon the probable lines of its future development, and the place in human economy which it aims to fill.

RHETORIC

The courses at present offered in rhetoric are four, and extend over two years and one term. The object of the courses is not only to acquaint the student with the principles of rhetoric, but to teach him correctness and effectiveness in the use of English. In the first year's work a text-

book is used, supplemented with lectures and a critical discussion of the written exercises. From ten to thirty short themes a term are required from each student. More emphasis is put upon practice than upon theory.

The second year's work is a daily theme course, and is intended to give practice in higher English composition and criticism.

A one-term course is offered in the theory and practice of argumentative discourse.

ROMANCE LANGUAGES AND LITERATURES

This department offers four years of instruction in French and one year each in Spanish and Italian. In the elementary courses the main object is to give the student correct pronunciation, grammatical knowledge, and the ability to read the languages with facility. In the second year attention is especially directed to various phases of nineteenth century literature; effort is made to ground the student thoroughly in the modern idiom, and lectures are given upon the outlines of French literature. The work of the third year is a study of the masterpieces of the seventeenth century. Ability to understand readily spoken French is requisite for admission to this course. The field of the fourth year's work is literature and society in the eighteenth century. A graduate course is offered in Old French; some of the more important texts are studied, and attention is given to the origins of the language.

SOCIOLOGY

(See economics in the philosophical group in the College of Science, p. 120, and courses 6 and 7, under economics, in the "General Description of Courses," p. 232. See also, for allied courses, anthropology, p. 160, and psychology, p. 185.)

SPANISH

(See Romance Languages.)

COLLEGE OF ENGINEERING

FACULTY

ANDREW S. DRAPER, LL.D., PRESIDENT.
N. CLIFFORD RICKER, M.ARCH., DEAN, Architecture.
THOMAS J. BURRILL, PH.D., LL.D., Botany.
SAMUEL W. SHATTUCK, C.E., Mathematics.
IRA O. BAKER, C.E., Civil Engineering.
CHARLES W. ROLFE, M.S., Geology.
ARTHUR N. TALBOT, C.E., Municipal and Sanitary Engineering, Mechanics.
ARTHUR W. PALMER, Sc.D., Chemistry.
FRANK F. FREDERICK, Art and Design.
SAMUEL W. PARR, M.S., Applied Chemistry.
DANIEL K. DODGE, PH.D., English.
LESTER P. BRECKENRIDGE, PH.B., Mechanical Engineering.
DAVID KINLEY, PH.D., Economics.
DANIEL H. BRUSH, CAPTAIN 17TH INFANTRY, U.S.A., Military Science.
ALBERT P. CARMAN, Sc.D., Physics and Electrical Engineering.
GEORGE W. MYERS, PH.D., Astronomy and Applied Mathematics.
EDGAR J TOWNSEND, PH.M., Mathematics.
JAMES M. WHITE, B.S., Architecture.
WILLIAM H. VAN DERVOORT, M.E., Mechanical Engineering.
WILLIAM D. PENCE, C.E., SECRETARY, Civil Engineering.
HARRY S. GRINDLEY, Sc.D., Chemistry.
T. ARKLE CLARK, B.L., Rhetoric.

Herman S Piatt, A.M., French.
Bernard V. Swenson, B.S., Electrical Engineering.
Fred A. Sager, B.S., Physics.
William Esty, A.M., Electrical Engineering.
Cyrus D. McLane, B.S., Architecture, Mechanics.
James D. Phillips, B.S., General Engineering Drawing.
Seth J. Temple, B.S., Architecture.
Violet D. Jayne, A.M., English.
Alton C. Burnham, B.S., Mathematics.
Oscar Quick, A.M., Physics.
Edward J. Lake, B.S., Free-Hand Drawing.
Chester H. Rowell, Ph.B., German.
George H. Meyer, A.M., German.
William H. Kavanaugh, M.E., Mechanical Engineering.
William C. Brenke, B.S., Mathematics.
James H. McKee, B.S., Mechanical Engineering.
George D. Hubbard, B.S., Geology.
Hubert A. Webber, B.S., General Engineering Drawing.
Charles V. Seastone, B.S., Mechanics.
Richard B. Ketchum, B.S., Civil Engineering.
Hubert V. Carpenter, B.S., Physics.
Cyril B. Clark, Machine Shop.
Albert R. Curtiss, Wood Shop.
Henry Jones, Forge Shop.
Joseph H. Wilson, Foundry.
Albert C. Hobart, B.S., Fellow, Civil Engineering.
Edward W. Poole, B.S., Fellow, Electrical Engineering.
Albert St. J. Williamson, Military.

AIMS AND SCOPE

The purpose of the College of Engineering is thoroughly to educate engineers and architects. Its aim is therefore twofold—general and technical. A considerable proportion of the course of study is devoted to general and literary work, since a graduate is now expected to arrange his ideas in clear order and to write and speak effectively. Professional success depends upon this power far more than is commonly supposed.

There is an ever increasing fund of general and scientific knowledge with which every educated man is expected to be conversant, if he desires to retain the esteem of his associates and clients. Much of the most valuable of this knowledge is still locked up in foreign languages, and these must be acquired by patient study and practice.

It might appear that this general training would be sufficient to demand the entire attention of the student during his whole course, but not less than one-half his time must be given to purely technical training and to the acquirement of a professional capital or a stock of information and knowledge of details.

METHODS OF INSTRUCTION

Whenever suitable text-books can be found, they are employed, because their use saves much time in acquiring facts and data, and because such books become doubly valuable for later reference when enriched by notes and additions. But to arouse most fully the enthusiasm of the student, discussions and formal lectures are necessary, and they must be fully illustrated by sketches, diagrams, drawings, and photographs of executed work. In all courses of study offered by this College, drawing, in its manifold forms and uses, is made a special feature, both in its applications and its modes of execution.

EQUIPMENT

The equipment of the various departments is described under appropriate heads. In addition to this, the College has a good reference library and some valuable apparatus of a general character. The most important portion consists of a collection of machines and apparatus for abbreviating computations, and especially for use in the calculation of tables. The principal instruments are here described:

(1) A Thomas ten-place arithmometer, the largest size manufactured, imported especially for the University, and giving products of numbers to twenty places. (2) Two

Thacher's computing scales for performing multiplication, division, squaring, and extraction of square root. (3) An Amsler's polar planimeter for measuring areas of figures of any form, and employed principally in graphic statics, or in measuring indicator diagrams. (4) A Coradi's rolling planimeter and a Coradi's polar planimeter for very accurate use. (5) An Amsler's integrator for obtaining area, static moment, and moment of inertia of a plane figure, especially of sections of columns, beams, etc. (6) A Coradi's pantagraph of best construction for the reduction of drawings and maps. (7) Various computing machines, including Boucher's calculator, Ram's slide rules, duplex slide rule, Webb's adder, the ribbon adder, etc. (8) Grant's computing machines.

DESCRIPTION OF DEPARTMENTS

ARCHITECTURE

The department of architecture and architectural engineering occupies nearly the entire upper story of Engineering Hall, with spacious drawing rooms lighted by skylights, convenient class rooms, cabinet, museum, and studies.

EQUIPMENT

A large collection of casts of ornament from Spain and from Germany are jointly used by the departments of architecture and of art. Models of ceilings, roof trusses, stairs, joints in woodwork, with a large number of specimens of stone, terra cotta, molded bricks, etc., are found in the architectural collections, together with some interesting Norwegian, Indian, and Japanese art works. A series of working drawings of buildings, designed by noted architects, is placed in the architectural cabinet for convenient reference.

A fine collection of 20,000 engravings, photographs, and photoprints, mounted on cards eleven by fourteen inches, is placed in the drawing rooms, classified according to the Dewey decimal system, for use in construction, history of

architecture, and designing, forming a most valuable working library for draftsmen and designers.

An electric arc lantern is permanently placed in a special lecture room with stepped floor. For use with it, there are 2,500 lantern slides, illustrating the history of architecture, including Richardson's best work, American houses and clubhouses, and European buildings.

The University has an excellent working library in architecture and building, and the department has a fine collection of books for use in architectural designing.

Apparatus is provided for making tests in heating and ventilation, and for making photographs and lantern slides.

The department also possesses a large collection of working drawings, from the offices of noted architects, of residences, offices, United States buildings, and especially of the more important structures of the World's Columbian Exposition.

COURSE OF INSTRUCTION

Required for Degree of B.S. in Architecture

First Year

1. Advanced Algebra and Trigonometry (Math. 2, 4); Elements of Drafting (Drawing, Gen. Eng'g 1); Free-hand Drawing or Modeling (Arch. 20 or 21); French 5, or German 1, or English 1, 2; Military 1, 2; Physical Training 1.

2. Advanced Algebra (Math. 2); Descriptive Geometry (Drawing, Gen. Eng'g 2); Free-hand Drawing or Water Color (Arch. 20 or 21); French 5, or German 1, or English 1, 2; Military 1, 2; Physical Training 1.

3. Analytical Geometry (Math. 6); Lettering and Sketching (Drawing, Gen. Eng'g 3, 4); Architectural Drawing (Arch. 8); French 5, or German 7, or English 1, 2; Military 2; Physical Training 1.

Second Year

1. Applied Mechanics (Theo. and App. Mech. 4); Wood Construction (Arch. 2); Physics 1, 3; Architectural Drawing (Arch. 9); Rhetoric 2; Military 2.

2. Strength of Materials (Theo. and App. Mech. 5); Stone, Brick, and Metal Construction (Arch. 3); Physics 1, 3; Architectural Drawing (Arch. 9); Rhetoric 2; Military 2.

3. Sanitary Construction (Arch. 4); Free-hand Drawing or Sketching (Arch. 20 or 21);Physics 1, 3; Architectural Drawing (Arch. 9); Rhetoric 2; Military 2; Vacation Sketches (Arch. 26).

Third Year

1. History of Architecture (Arch. 6); Architectural Seminary (Arch. 11); Architectural Designing (Arch. 17); Chemistry 1; Architectural Drawing (Arch. 9).

2. History of Architecture (Arch. 6); Architectural Seminary (Arch. 11); Architectural Perspective (Arch. 14); Requirements and Planning of Buildings (Arch. 15); Architectural Drawing (Arch 9).

3. History of Architecture (Arch. 7); Architectural Seminary (Arch. 11); Roofs (Arch. 5); Architectural Composition (Arch. 18); Architectural Drawing (Arch. 9); Vacation Sketches (Arch. 26).

Fourth Year

1. Heating and Ventilation (Arch. 13); Architectural Designing (Arch. 16); Renaissance Design (Arch. 22); Thesis.

2. Superintendence, Estimates, and Specifications (Arch. 12); Gothic Design (Arch. 23); Romanesque Design (Arch. 24)*; Thesis.

3. Surveying (Civil Eng'g 10); Composition of Ornament (Arch. 25); Thesis.

ARCHITECTURAL ENGINEERING

This course of study prepares graduates for professional employment as architects, structural designers and computers, as well as superintendents of construction. It is intended for students who perfer the structural and mathematical side of the profession to its artistic side, and who desire to pursue the full engineering course in mathematics and to acquire a thorough knowledge of the iron and steel construction now employed in buildings. It differs from the architectural course principally in the addition of a second year of mathematics; in the substitution of a year of civil engineering study in bridge analysis and design for the year of free-hand drawing, and in devoting considerably less time to architectural drawing and designing.

*A second term in Arch. 22 will be accepted in lieu of Arch. 23 or Arch. 24.

COURSE OF INSTRUCTION

Required for Degree of B.S. in Architectural Engineering

First Year

1. Advanced Algebra and Trigonometry (Math. 2, 4); Elements of Drafting (Drawing, Gen. Eng'g 1); Shop Practice (Mech. Eng'g 1); French 5, or German 1, or English 1, 2; Military 1, 2; Physical Training 1.

2. Advanced Algebra (Math. 2); Descriptive Geometry (Drawing, Gen. Eng'g 2); Shop Practice (Mech. Eng'g 1); French 5, or German 1, or English 1, 2; Military 1, 2; Physical Training 1.

3. Analytical Geometry (Math. 6); Lettering and Sketching (Drawing, Gen. Eng'g 3, 4); Architectural Drawing (Arch. 8); French 5, or German 7, or English 1, 2; Military 2; Physical Training 1.

Second Year

1. Differential Calculus (Math. 7); Wood Construction (Arch. 2); Physics 1, 3; Architectural Drawing (Arch. 9); Rhetoric 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); Stone, Brick, and Metal Construction (Arch. 3); Physics 1, 3; Architectural Drawing (Arch. 9); Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9); Sanitary Construction (Arch. 4); Physics 1, 3; Architectural Drawing (Arch. 9); Rhetoric 2; Military 2.

Third Year

1. Analytical Mechanics (Theo. and Appl'd Mech. 1); History of Architecture (Arch. 6); Architectural Drawing (Arch. 9); Architectural Seminary (Arch. 11); Chemistry 1.

2. Resistance of Materials (Theo. and Appl'd Mech. 2); History of Architecture (Arch. 6); Architectural Drawing (Arch. 9); Architectural Seminary (Arch. 11); Chemistry 16.

3. Hydraulics (Theo. and Appl'd Mech. 3); Roofs (Arch. 5); Dynamo-Electric Machinery (Elect. Eng'g 2); Architectural Drawing (Arch. 9).

Fourth Year

1. Bridge Analysis (Civil Eng'g 12); Architectural Designing (Arch. 16); Heating and Ventilation (Arch. 13); Thesis.

2. Bridge Details (Civil Eng'g 13); Superintendence, Estimates, and Specifications (Arch 12); Thesis.

3. Bridge Design (Civil Eng'g 14); Surveying (Civil Eng'g 10); Architectural Engineering (Arch. 19); Thesis.

CIVIL ENGINEERING

The design in this department is to furnish a course of theoretical instruction, accompanied and illustrated by a large amount of practice, which will enable the student to enter intelligently upon the various and important duties of the civil engineer. While the instruction aims to be practical by giving the student information and practice directly applicable in his future professional work, the prime object is the development of the mental faculties. The power to acquire information and the ability to use it are held to be of far greater value than any amount of so-called practical knowledge.

EQUIPMENT

This department has an extensive equipment of compasses, engineers' transits, solar transits, levels,—ordinary and precise,—plane tables, sextants, chronometers, barometers, etc. For the lecture room, the department is provided with full-size joints of an actual railroad bridge, sections of columns, eye-bars, etc., and a large collection of lithographs, photographs and blue-prints of bridges and buildings.

COURSE OF INSTRUCTION

Required for the Degree of B. S. in Civil Engineering

First Year

1. Advanced Algebra and Trigonometry (Math. 2, 4); Elements of Drafting (Drawing, Gen. Eng'g 1); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 1, 2; Physical Training 1.

2. Advanced Algebra (Math. 2); Descriptive Geometry (Drawing, Gen. Eng'g 2); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 1, 2; Physical Training 1.

3. Analytical Geometry (Math. 6); Lettering and Sketching (Drawing, Gen. Eng'g 3, 4); Shop Practice (Mech. Eng'g 1); French 5, or German 5, or English 1, 2; Military 2; Physical Training 1.

Second Year

1. Differential Calculus (Math. 7); Land Surveying (Civil Eng'g 1); Physics 1, 3; Rhetoric 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); Drawing and Surveying (Civil Eng'g 2 and 3); Physics 1, 3; Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9); Drawing and Surveying (Civil Eng'g 2 and 3); Physics 1, 3; Rhetoric 2; Military 2.

Third Year

1. Analytical Mechanics (Theo. and Appl'd Mech. 1); Railroad Engineering (Civil Eng'g 4); Chemistry 1.

2. Resistance of Materials (Theo. and Appl'd Mech. 2); Railroad Engineering (Civil Eng'g 4); Road Engineering (Municipal and San. Eng'g 1); Steam Engines (Mech. Eng'g 16); Steam Boilers (Mech. Eng'g 17).

3. Hydraulics (Theo. and Appl'd Mech. 3); Descriptive Astronomy (Astronomy 4a); Roofs (Arch. 5).

Fourth Year

1. Masonry Construction (Civil Eng'g 5); Bridge Analysis (Civil Eng'g 12); Water Supply Engineering (Mun. and San. Eng'g 2); Thesis.

2. Bridge Details (Civil Eng'g 13); Sewerage (Mun. and San. Eng'g 3); any two of the following: Railroad Structures (Civil Eng'g 17); Tunneling (Civil Eng'g 15); Geodesy (Civil Eng'g 6); Thesis.

3. Bridge Design (Civil Eng'g 14); Geology 3; Practical Astronomy (Astronomy 6, *half term*); Engineering Contracts and Specifications (Civil Eng'g 16); Thesis.

ELECTRICAL ENGINEERING

INSTRUCTION

This is a course in theoretical and applied electricity. It extends through four years. The first two years are substantially the same as in the mechanical engineering courses. In the last two years the course includes the fundamental subjects in theoretical and applied mechanics and steam engineering, but a large part of the time is given to courses in electricity and its applications. The features of the instruction are the facilities offered for laboratory work by the student; the work done in calculating, designing and making working drawings of electrical apparatus; the senior thesis requirements and facilities offered for original work.

EQUIPMENT

The class rooms, drafting rooms, seminary rooms, laboratory for more exact electrical measurements, studies, and offices are in Engineering Hall. The dynamo laboratory, battery room, photometer room, and workshop are in the Mechanical and Electrical Engineering Laboratory..

The department has the six large pier-rooms of the physics department for the more exact electrical and magnetic measurements. These rooms, with their equipment, are described in more detail under the equipment of the physics department. The drafting and seminary rooms are well lighted and supplied with every convenience. The seminary room is accessible to members of the upper classes at all times. It contains files of the leading journals of theoretical and applied electricity in English, French, and German, besides a department reference library.

The dynamo laboratory is equipped with various types of direct current dynamos and motors, alternators and transformers, with apparatus and every convenience for making complete tests. Included in this equipment are a 300-light Thomson-Houston alternator with exciter, switchboard appliances, and a large number of transformers of various makes; also Brush and Thomson-Houston arc light machines, Thomson-Houston and Edison incandescent machines, and 500-volt generators, several Jenny motors, and two small Westinghouse single-phase machines. The equipment includes a large number of Weston voltmeters, ammeters and wattmeters, thus giving facilities for the accurate determination of E. M. F., current and power in both direct and alternate current circuits. In addition to these are various other standard instruments, such as a number of Whitney and Hoyt ammeters, Kelvin balances and electrostatic voltmeters, several different makes of recording and indicating wattmeters, electro-dynamometers, electrometers, hysteresis meters, condensers, inductive and non-inductive resistances, lamp and water rheostats, Brackett cradle dynamometer, tachometers, revolving con-

tact makers, and other devices and appliances which are essential to the thorough experimental study of direct and alternating currents.

The photometer room is supplied with an electric-light photometer, types of incandescent and of direct and alternating current arc lamps, and various conveniences for making electric light tests.

The battery room contains a collection of primary cells and a large battery of secondary cells, fitted with switchboard and testing conveniences.

The workshop is supplied with an engine lathe, a speed lathe, grinder, etc., and a line of fine tools. An electric motor furnishes power for this machinery. The services of an experienced mechanic enable the department to manufacture special apparatus as required.

The University electric lighting and power plant is available for tests for the department. It consists of two Westinghouse two-phase alternating current dynamos, one of 75-kilowatt and one of 45-kilowatt capacity, with four induction motors, having a combined output of 100 horse power; a 30-kilowatt 500-volt constant potential generator with six motors, and a Wood series arc light machine for lighting the grounds and Military Hall. The transformer capacity of the alternating plant is for seven hundred 16-candle power incandescent lamps. The prime motors for the plant are 100 horse power and 50 horse power Ideal steam engines and a 50 horse power Westinghouse steam engine.

COURSE OF INSTRUCTION

Required for the Degree of B. S. in Electrical Engineering

First Year

1. Advanced Algebra and Trigonometry (Math. 2, 4); Elements of Drafting (Drawing, Gen. Eng'g 1); Shop Practice (Mech. Eng'g 1); French 5, or German 1, or English 1, 2; Military 1, 2; Physical Training 1.

2. Advanced Algebra (Math. 2); Descriptive Geometry (Drawing, Gen. Eng'g 2); Shop Practice (Mech. Eng'g 1); French 5, or German 1, or English 1, 2; Military 1, 2; Physical Training 1.

3. Analytical Geometry (Math. 6); Lettering and Sketching (Drawing, Gen. Eng'g 3, 4); Shop Practice (Mech. Eng'g 1); French 5, or German 7, or English 1, 2; Military 2; Physical Training 1.

Second Year

1. Differential Calculus (Math. 7); Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1, 3; Rhetoric 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1, 3; Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9); Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1, 3; Rhetoric 2; Military 2.

Third Year

1. Analytical Mechanics (Theo. and Appl'd Mech. 1); Mechanism (Mech. Eng'g 5); Chemistry 1; Electrical and Magnetic Measurements (Physics 4).

2. Resistance of Materials (Theo. and Appl'd Mech. 2); Steam Engines (Mech. Eng'g 16); Steam Boilers (Mech. Eng'g 17); Electrical and Magnetic Measurements (Physics 4); Elective (1 credit for winter and spring terms together), Mathematics 16, or Chemistry 3a, or Civil Engineering 10.

3. Hydraulics (Theo. and Appl'd Mech. 3); Mechanical Engineering Laboratory (Mech. Eng'g 13); Electrical Measurements (Physics 4); Elements of Dynamo Machinery (Elect. Eng'g 11); Elective (same as winter term).

Fourth Year

1. Thermodynamics (Mech. Eng'g 7); Dynamo-Electric Machinery (Elect. Eng'g 3a); Electrical Design (Elect. Eng'g 3b); Telegraphy and Telephony (Elect. Eng'g 6); Seminary (Elect. Eng'g 10); Thesis.

2. Alternating Currents and Alternating Current Machinery (Elect. Eng'g 4a); Electrical Design (Elect. Eng'g 4b); Photometry (Elect. Eng'g 5); Electric Lighting Plants (Elect. Eng'g 8); Seminary (Elect. Eng'g 10); Thesis.

3. Alternating Currents and Alternating Current Machinery (Elect. Eng'g 4a); Electrical Design (Elect. Eng'g 4b); Electrical Transmission of Power (Elect. Eng'g 9); Advanced Electrical Measurements (Physics 9); Seminary (Elect. Eng'g 10); Thesis.

MECHANICAL ENGINEERING

It is the object of this course to give the student a thorough training in the theoretical principles underlying the science of machines and mechanics, and at the same time to enable him to become practically familiar with some of the numerous applications of these principles.

EQUIPMENT

The equipment of this department is arranged for work under three heads—class and drawing room work, laboratory work, and shop practice.

The *drawing rooms* are equipped with modern desks, boards, filing cabinets, card indexes, reference books, catalogues, odontographs, gear charts, tables, etc. In the cabinet rooms are kinematic models and sectioned steam specialties, many of which were donated by the manufacturers.

The *steam engineering laboratory* is in the *Mechanical and Electrical Engineering Laboratory*. It contains the lighting and power plant of the University, consisting of one 50 horse power Ideal single-cylinder, high-speed engine, one 50 horse power Westinghouse engine, and one 100 horse power Ideal tandem compound engine. These engines are supplied with high pressure steam through an independent main to the boilers.

There are five other experimental steam engines, connected by independent steam main to the boilers. There are also gas engines, air compressors, a volume fan, steam pumps, a hot air engine, and numerous steam specialties arranged for experimental tests.

The laboratory contains a large assortment of the usual instruments for testing purposes. A four-ton traveling crane of 20-foot span covers the central floor space.

The boiler room of the new central heating station contains two vertical boilers, one 100 horse power horizontal tubular boiler, equipped with Brightman mechanical stoker, one 250 horse power National water tube boiler, equipped with the Murphy furnaces, two 220 horse power Babcock

& Wilcox boilers, equipped with the Roney mechanical stokers, together with all necessary accessory apparatus, all available for testing purposes. The pumping station and power plants of the two cities furnish additional opportunities for experimental work.

Considerable apparatus designed for use on locomotive road tests has been constructed and arrangements have been made for regular tests of locomotives in actual service.

The machine shop, foundry, and forge shop are located in the Metal Shops.

The *machine shop* contains one twenty-seven-inch by twelve-foot bed F. E. Reed & Co. engine lathe; one twenty-one-inch by fourteen-foot bed Putnam Standard Engine lathe; twelve engine lathes of from twelve- to twenty-inch swing; two ten-inch speed lathes; one centering lathe; one fifteen-inch Gould & Eberhardt shaper; one fifteen-inch Hendey shaper; one No. 3 Brown & Sharpe plain milling machine; one Brainard universal milling machine; one twenty- by twenty-inch by five-foot Putnam planer; one thirty- by thirty-inch by eight-foot G.A.Gray & Co.,planer; one No. 2 improved Brown & Sharpe universal grinding machine; one Brown & Sharpe cutter and reamer grinder; one No. 1 Bickford radial drill; one twenty-eight-inch drill press; one twenty-inch drill press; one sensitive drill press; one water emery tool grinder; one center grinding machine; one Stover power hack saw; one Worcester twist drill grinder; complete set of United States standard taps and dies; drills, arbors, reamers, gear and milling cutters, caliper gauges, calipers, scales, and other small tools.

The *wood shop* occupies the first floor of the Wood Shops and Testing Laboratory, and contains twenty-six improved wood-working benches, fourteen of which are fitted with Wyman and Gordon patent vises; one thirty-four-inch F. H. Clement & Co. band saw; one thirty-six inch Yerkes & Finan band saw; one twenty-inch Clement Co. band saw; one thirty-six-inch Yerkes & Finan band saw; one twenty-inch Clement & Co. wood planer; one J. A.

Fay & Co. jig-saw; one J. A. Fay & Co. jointer; eight ten-inch wood lathes; one eighteen-inch pattern-maker's lathe; one No. 4 E. Fox trimmer, together with a complete equipment of small tools.

The *foundry* occupies a room 48 by 48 feet in the Metal Shops, and is equipped with a twenty-four-inch Whiting patent cupola, a core oven, and the necessary sand, ladels, and flasks for making castings. A No. 7 Buffalo steel pressure fan furnishes blast for the cupola.

The *forge shop* occupies a room 36 by 48 feet in the Metal Shops, and contains ten latest improved Buffalo down-draft forges. Blast is furnished these forges by a No. 5 Sturtevant pressure blower, and all gases of combustion are exhausted under ground by means of a No. 9 Sturtevant exhaust fan.

COURSE OF INSTRUCTION

Required for the Degree of B. S. in Mechanical Engineering.

First Year

1. Advanced Algebra and Trigonometry (Math. 2, 4); Elements of Drafting (Drawing, Gen. Eng'g 1); French 5, or German 1, or English 1, 2; Shop Practice (Mech. Eng'g 1); Military 1, 2; Physical Training 1.

2. Advanced Algebra (Math. 2); Descriptive Geometry (Drawing, Gen. Eng'g 2); French 5, or German 1, or English 1, 2; Shop Practice (Mech. Eng'g 1); Military 1, 2; Physical Training 1.

3. Analytical Geometry (Math. 6); Lettering and Sketching (Drawing, Gen. Eng'g 3 and 4); French 5, or German 7, or English 1, 2; Shop Practice (Mech. Eng'g 1); Military 2; Physical Training 1.

Second Year

1. Differential Calculus (Math. 7); Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1, 3; Rhetoric 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1, 3; Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9); Elements of Machine Design (Mech. Eng'g 4); Shop Practice (Mech. Eng'g 2); Physics 1, 3; Rhetoric 2; Military 2.

Third Year

1. Analytical Mechanics (Theo. and Appl'd Mech. 1); Mechanism (Mech. Eng'g 5); Chemistry 1; Power Measurements (Mech. Eng'g 3).

2. Resistance of Materials (Theo. and Appl'd Mech. 2); Steam Engines (Mech. Eng'g 16); Steam Boilers (Mech. Eng'g 17); Chemistry 16; Power Measurements (Mech. Eng'g 3).

3. Hydraulics (Theo. and Appl'd Mech. 3); Electrical Engineering (Elect. Eng'g 1); Surveying (Civil Eng'g 10); Power Measurements (Mech. Eng'g 3).

Fourth Year

1. Thermodynamics (Mech. Eng'g 7); High Speed Steam Engine Design (Mech. Eng'g 14); Valve Gears (Mech. Eng'g 15); Advanced Mechanical Laboratory (Mech. Eng'g 12); Seminary (Mech. Eng'g 19); Thesis.

2. Mechanics of Machinery (Mech. Eng'g 8); Graphical Statics of Mechanism (Mech. Eng'g 18); Advanced Designing (Mech. Eng'g 9); Advanced Mechanical Laboratory (Mech. Eng'g 12); Seminary (Mech. Eng'g 19); Thesis.

3. Mechanics of Machinery (Mech. Eng'g 8); Advanced Designing (Mech. Eng'g 9); Estimates (Mech. Eng'g 10); Seminary (Mech. Eng'g 19); Thesis.

MUNICIPAL AND SANITARY ENGINEERING

This course is designed for students desiring to make a specialty of city engineering work. It prepares for the varied duties of engineer of the department of public works of cities and includes instruction in modern methods of sanitation of cities.

INSTRUCTION

Instruction is given by lectures, by text-book and seminary work, and by field, laboratory, and drafting work. The methods of training are intended to develop power to take up and solve new problems connected with municipal public works, as well as to design and to superintend the ordinary constructions. Surveying, structural materials, and structural design are taught as in the civil engineering course. Chemistry, botany, and bacteriology, so far as necessary to a

comprehension of the questions involved in water supply and sewage disposal, are given.

COURSE OF INSTRUCTION

Required for Degree of B. S. in Municipal and Sanitary Engineering

First Year

1. Advanced Algebra and Trigonometry (Math. 2 and 4); Elements of Drafting (Drawing, Gen. Eng'g 1); Shop Practice (Mech. Eng'g 1); French 5, or German 1, or English 1, 2; Military 1, 2; Physical Training 1.

2. Advanced Algebra (Math. 2); Descriptive Geometry (Drawing, Gen. Eng'g 2); Shop Practice (Mech. Eng'g 1); French 5, or German 1, or English 1, 2; Military 1, 2; Physical Training 1.

3. Analytical Geometry (Math. 6); Lettering and Sketching (Drawing, Gen. Eng'g 3, 4); Shop Practice (Mech. Eng'g 1); French 5, or German 7, or English 1, 2; Military 2; Physical Training 1.

Second Year

1. Differential Calculus (Math. 7); Land Surveying (Civil Eng'g 1); Physics 1, 3; Rhetoric 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); Drawing and Surveying (Civil Eng'g 2, 3); Physics 1, 3; Rhetoric 2; Military 2.

3. Integral Calculus (Math. 9); Drawing and Surveying (Civil Eng'g 2 and 3); Physics 1, 3; Rhetoric 2; Military 2.

Third Year

1. Analytical Mechanics (Theo. and Appl'd Mech. 1); Railroad Engineering (Civil Eng'g 4); Chemistry 1.

2. Resistance of Materials (Theo. and Appl'd Mech. 2); Road Engineering (Mun. and San. Eng'g 1); Railroad Engineering (Civil Eng'g 4); Bacteriology (Mun. and San. Eng'g 5a); Steam Engines and Boilers (Mech. Eng'g 16).

3. Hydraulics (Theo. and Appl'd Mech. 3); Roofs (Arch. 5); Practical Electrical Engineering (Elect. Eng'g 1).

Fourth Year

1. Water Supply Engineering (Mun. and San. Eng'g 2); Masonry Construction (Civil Eng'g 5); Bridge Analysis (Civil Eng'g 12); Thesis.

2. Sewerage (Mun. and San. Eng'g 3); Bridge Details (Civil Eng'g 13); Chemistry 3a; Thesis.

3. Water Purification, Sewage Disposal, and General Sanitation (Mun. and San. Eng'g 6); Engineering Contracts and Specifications (Civil Eng'g 16); Mechanical Engineering Laboratory (Mech. Eng'g 13); Chemistry 20; Thesis.

PHYSICS

The courses in this department are designed to furnish the student who intends to follow the profession of engineering, science teaching, or research in physical science, with such a knowledge of the phenomena and laws of physics as may be of greatest use in his chosen calling.

EQUIPMENT

The rooms devoted to physics are in Engineering Hall. They include a large lecture room and cabinet, a large general laboratory and cabinet, several small laboratories, a constant-temperature room, a battery room, a workshop, and several private studies, laboratories, and offices.

The *lecture room* is in the form of an amphitheater, and is furnished with opera chairs provided with tablet arms. Piers at the lecture desk and in the center of the room make demonstrations with the more delicate apparatus possible. A permanent screen and rolling blinds operated by a motor facilitate illustration by lantern. The cabinet rooms adjoining the lecture room are supplied with apparatus suitable for illustration and demonstration, and are provided with conveniences for preparing apparatus for lectures.

The general laboratory is a room sixty feet square and is well lighted and ventilated. It is supplied with tables, shelves, and sinks, arranged for general experimental work. The cabinet room adjoining this laboratory contains the apparatus designed for elementary experimental work, and also a line of high-grade apparatus intended for advanced experimental work and research.

The *small laboratories*, six in number, are on the first floor, and are abundantly provided with masonry piers, wall shelves, sinks, dark curtains, etc. These rooms are now equipped with apparatus for electrical measurements.

The *constant-temperature* room is on the first floor. It is isolated from the surrounding space by double masonry walls and double doors. It is arranged for such experiments as require a low, uniform temperature.

The department shares with the electrical engineering department the workshop in Mechanical and Electrical Engineering Laboratory. This gives the department special facilities for preparing special apparatus of use in advanced and original investigations.

In addition to the preceding, there are a number of private studies and laboratories for the use of advanced students and instructors.

Electrical current is supplied to all the laboratories from the battery room, and also from the dynamo laboratory in Mechanical and Electrical Engineering Laboratory.

THEORETICAL AND APPLIED MECHANICS

The courses in theoretical and applied mechanics are designed to meet the needs of students of the College of Engineering.

EQUIPMENT

The laboratory of applied mechanics is located in the Metal Shops. It comprises the materials laboratory and the hydraulic laboratory.

The *materials laboratory* has an Olsen testing machine of 200,000 pounds' capacity, arranged to test beams twenty feet long; a Riehle testing machine of 100,000 pounds' capacity; a smaller apparatus for testing beams, a Riehle wire-testing machine, extensometers and deflectometers, a stone-grinding machine, a rattler for abrasion tests of stone and brick, with other apparatus for making all necessary measurements and observations, etc. The laboratory is fitted up as a working laboratory, where students may acquire such practice in experimental work as engineers are called upon to perform, as well as for the purpose of illustrating principles, and also for use in original investigation.

The *hydraulic laboratory* contains a steel standpipe con-

nected with city water supply and having several openings, a steam pump, tanks, pits, scales, pressure gauges, hook gauges, meters, including a Venturi meter, water motor and other apparatus for experiments with orifices, tubes, weirs, pipes, hose, and nozzles. Experiments are made in connection with the regular class instruction.

COLLEGE OF SCIENCE

FACULTY.

ANDREW S. DRAPER, LL.D., PRESIDENT.
STEPHEN A. FORBES, PH.D., DEAN, Zoölogy.
THOMAS J. BURRILL, PH.D., LL.D., Botany and Horticulture.
SAMUEL W. SHATTUCK, C.E., Mathematics.
CHARLES W. ROLFE, M.S., Geology.
ARTHUR W. PALMER, SC.D., Chemistry.
FRANK F. FREDERICK, Art and Design.
SAMUEL W. PARR, M.S., Applied Chemistry.
DAVID KINLEY, PH.D., Economics.
DANIEL H. BRUSH, CAPTAIN 17TH INFANTRY, U.S.A., Military Science and Tactics.
ARNOLD TOMPKINS, PH.D., Pedagogy.
ALBERT P. CARMAN, SC.D., Physics.
GEORGE T. KEMP, M.D., PH.D., Human Physiology and Vertebrate Anatomy.
EVARTS B. GREENE, PH.D., History.
GEORGE W. MYERS, PH.D., Astronomy and Mathematics.
EDGAR J TOWNSEND, PH.M., Mathematics.
HENRY H. EVERETT, Physical Training.
HARRY S. GRINDLEY, SC.D., Chemistry.
T. ARKLE CLARK, B.L., Rhetoric.
HERMAN S PIATT, PH.D., French.
ARTHUR H. DANIELS, PH.D., Philosophy.
CHARLES W. TOOKE, PH.D., Public Law and Administration.
FRED A. SAGER, B.S., Physics.
FRANK SMITH, A.M., SECRETARY, Zoölogy.

John E. McGilvrey, A.B., Pedagogy.
Violet D. Jayne, A.M., English.
Charles A. Kofoid, Ph.D., Zoölogy.
A. C. Burnham, B.S., Mathematics.
Oscar Quick, A.M., Physics.
Edward J. Lake, B.S., Free-Hand Drawing.
Ella H. Morrison, Physical Training for Women.
George A. Huff, Jr., Coach of Athletic Teams.
Carlton R. Rose, Ph.M., Chemistry.
Agnes S. Cook, A.B., Rhetoric.
Arthur C. Howland, Ph.D., History.
Chester H. Rowell, Ph.B., German.
George H. Meyer, A.M., German.
John P. Hylan, Ph.D., Psychology.
Charles F. Hottes, M.S., Botany.
Clendon V. Millar, M.S., Chemistry.
William C. Brenke, B.S., Mathematics.
Charles T. Wilder, B.S., Photography.
George D. Hubbard, B.S., Geology.
Hubert V. Carpenter, B.S., Physics.
John L. Sammis, B.S., Chemistry.
Robert W. Stark, B.S., Chemistry.
Matthew B. Hammond, Ph.D., Economics and Sociology.
F. W. Schacht, B.S., Fellow, Zoölogy.
Arthur E. Paul, B.S., Fellow, Chemistry.
Albert St. J. Williamson, Military Science.

AIMS AND SCOPE

The College of Science is based upon the idea that the methods of science and the branches of study to which those methods are applicable present a subject-matter and a discipline ample for the purposes of a liberal education, and that an education so derived differs materially in character and value from one whose sources are mainly literary. This College is distinguished in general from the technical colleges of the University by the fact that its choice of subjects is not limited by practical ends, and from the College of

Literature and Arts by the predominance, in its courses and requirements, of the strictly scientific subjects. It is articulated with the latter, however, by the liberal elections from the literary courses permitted to students who have satisfied its demands as to scientific work, and by the special courses in science open to election by students from the companion college.

It affords an opportunity for the study of the natural, physical, mathematical, and mental sciences, and of economic, sociological, and philosophical subjects, either as specialties or as the substance of a general education. The candidate for graduation may take a year each in any four of the principal subjects of this College, with a considerable amount of language, literature, and general study; he may concentrate his major work on any one of the several subjects in which major courses are offered; or he may adopt any program of concentration of his major work intermediate between these extremes. The subjects presented in this College are accordingly arranged in four groups,—chemical and physical, mathematical, natural science, and philosophical,—each characterized by the predominant importance and development of the subjects indicated by its name. The studies of each group are again divided into required and elective subjects, and the latter are further subdivided into two lists, A and B. All the required subjects are necessary to graduation in the group of studies specified; those of the elective lists A and B are open to election, restricted of the elective lists are restricted only by certain general requirements, varying in the different groups, regarding the amount and distribution of the work to be done on them.

It is the purpose of this system of classification and requirement to permit large liberty of choice with respect both to main lines of study and to associated or secondary subjects, and at the same time so to guide the student's elections that his course of study shall always contain a central core or axis of closely articulated major work. Preference

is further given by this means to those minor subjects most important because of their relations to the major work elected.

The only degree given in this College is that of bachelor of science. Forty full term-credits for University studies are required for graduation, three of which may be earned by investigation work, the results of which are to be presented in a final thesis. Credit will be given for fractions of courses of instruction in exceptional cases only, by vote of the College Faculty.

EQUIPMENT

Laboratories.—The College of Science occupies three of the University buildings—the Chemical Laboratory, Natural History Hall, and the Astronomical Observatory—together with several rooms in University Hall assigned to the mathematical department and to some of the departments of the philosophical group. The physics laboratories and lecture room are in Engineering Hall, and the natural history museum is in University Hall.

The laboratory and library facilities of this College have been acquired with primary reference to the needs of the undergraduate student, and are scarcely surpassed, for their purpose, in grade and completeness, among American universities. The graduate student likewise finds here an ample equipment, material, and opportunity for independent investigation in several departments of study, notably in those covered by the operations of the State Laboratory of Natural History and of the State Entomologist's office.

THE CHEMICAL AND PHYSICAL GROUP

AIMS

The purposes of the chemical and physical group may be distinguished as general and technological.

Provision is made for such students as desire to direct their attention to the purely scientific aspects of chemistry or physics.

Provision is made for the constantly growing demand for technical chemical knowledge and skill in the industrial world. Ample opportunities are offered those who wish to follow work along technological lines, special attention being given to the underlying chemical principles and their applications in the various industries.

For those who wish to prepare along the more advanced pharmaceutical lines, opportunity is offered for preparation in a thoroughly scientific manner for the work of the investigating and manufacturing pharmacist.

EQUIPMENT FOR CHEMISTRY

Laboratories.—The Chemical Laboratory is 75 by 120 feet and three stories high, including basement. The basement contains the water survey laboratory and rooms for storage and dispensing, and for work in assaying and metallurgical chemistry. The first floor has a lecture room and laboratory for general chemistry and qualitative analysis, each of which accommodates 150 students; a large private laboratory, and a store room. The second floor has a laboratory for quantitative analysis and organic chemistry, a balance and reading room, and a large private laboratory.

Rooms for the special work in physical chemistry are in University Hall.

Apparatus.—These laboratories are amply furnished with all the modern conveniences and supplies for the various lines of work in pure and applied chemistry.

The apparatus for general use includes twenty-nine high-grade analytical balances of Sartorius's, Becker's, and Troemner's make, an abundant supply of platinum ware, including combustion tubes, and a large retort for making pure hydrofluoric acid, Kahlbaum's mercurial air pumps, Schmidt and Haentsch saccharimeters, sets of Hofmann's and Lepsius' apparatus for lecture demonstrations, complete sets of Orsat's and Hempel's apparatus for gas analysis, spectroscopes, refractoscopes, calorimetric bombs, appliances for electrolytic analysis and for determination of physical constants.

A very important feature of the equipment consists of the chemical library, which, in addition to all the modern, standard chemical texts, dictionaries, and encyclopedias, includes complete sets of nearly all the more important chemical journals, especially the German and the English. The current numbers of many others are regularly received.

EQUIPMENT FOR PHYSICS

The rooms devoted to physics are in Engineering Hall. The general laboratory is equipped for general and advanced experimental work and research. The small laboratories, six in number, on the ground floor, are equipped with apparatus for electrical measurements and with a considerable amount of fine apparatus for measurements in light. The constant-temperature room, also on the ground floor, has double masonry walls and double floors, and is arranged for experiments requiring a uniform temperature. The workshop, near the small laboratories, is equipped for the manufacture and repair of apparatus. In addition to the preceding there are several private studies, laboratories, and offices for the use of instructors and advanced students.

CHEMICAL COURSES

CLASSIFICATION OF SUBJECTS

Prescribed

1. *Chemical.*—General Elementary Chemistry (Chem. 1); 1 credit.
   Descriptive Inorganic Chemistry (Chem. 2a); 1 credit.
   Inorganic Preparations (Chem. 2b); 1 credit.
   Organic Chemistry (Chem. 9); 2 credits.
   Qualitative Analysis (Chem. 3a, 3b); 2 credits.
   Quantitative Analysis (Chem. 5a, 5b); 2 credits.
   Seminary (Chem. 19); 2 credits.
2. *General.*—Advanced Algebra and Trigonometry (Math. 1 and 3, or 2 and 4); 2 credits.
   German 1, 8, 6; 6 credits.
   Military 1, 2, and Physical Training; 2 credits.
   Physics 1, 3; 3 credits.
   Rhetoric 2; 2 credits.

Elective

List A (Chemical)

Agricultural Chemistry (Chem. 13); 2 credits.
Chemical Technology (Chem. 6); 1 credit.
Elements of Organic Chemistry (Chem. 4); 1 credit.
Iron and Steel Analysis (Chem. 8); 1 credit.
Industrial Chemistry (Chem. 17); 1 credit.
Metallurgy (Chem. 14); 1 credit.
Metallurgical Chemistry (Chem. 15); 1, 2, or 3 credits.
Physical Chemistry (Chem. 7); 1, 2, or 3 credits.
Proximate Organic Analysis (Chem. 21); 1 or 2 credits.
Quantitative Analysis (Chem. 5c); 1 credit.
Sanitary Analysis (Chem. 10); 1 credit.
Special Courses (Chem. 18a, b, c, d); ⅕ to 5⅗ credits.
Theoretical Chemistry (Chem. 12); 1 credit.
Thesis and Investigations (Chem. 11); 2 credits.

List B (General)

Botany 6, 1; 1 or 3 credits.
Drawing, Gen'l Engineering 1; 1 credit.
Economics 1 to 18; 12 credits.
Electrical Engineering 1; 1 credit.
English 1 to 9; 1⅕ to 9 credits.
Geology 4, 1; 1, 2, or 3 credits.
Greek 1 to 3; 3 credits.
Latin 1 to 3; 3 credits.
Mathematics 2 to 9; 3 or 4 credits.
Mechanical Engineering 1, 2, 7, 16, 17; 1 to 6 credits.
Mineralogy 1, 2; 1, 2, or 3 credits.
Physics 4 to 7; 11 credits.
Physiology 4, 1; 1 or 2 credits.
Theoretical and Applied Mechanics 1 to 5; 1 to 3 credits.
Zoölogy 3, 1; 2 or 3 credits.

REQUIREMENTS FOR GRADUATION

In order to graduate in chemistry, the candidate must have completed all the required courses (25 credits), and must have at least three credits additional for subjects to be chosen from the chemical list A of electives. For the twelve remaining credits he must choose six subjects from list B and six either from lists A and B or from any University offerings for which he is prepared, subject to the approval

of the head of the department of chemistry. He must make, in all, forty full term-credits, and present an acceptable thesis.

Special exceptions as to the required number of chemical options may be made for those who desire to prepare themselves as teachers of chemistry rather than as technical chemists.

COURSE OF INSTRUCTION BY YEARS AND TERMS

The following program of prescribed courses and chemical electives shows the terms in which the principal studies of the chemical group must be taken. The prescribed studies, which are in *italics*, must be taken also in the year and term indicated.

First Year

1. *General Introductory Chemistry* (Chem. 1); *German* 1; Mathematics 3, or 2, 4; *Military* 1, 2; *Physical Training* 1.

2. *Descriptive Inorganic Chemistry* (Chem. 2a); *German* 1; Mathematics 1 or 2; *Military* 1, 2; *Physical Training* 1; *Qualitative Analysis* (Chem. 3a).

3. Analytical Geometry (Math. 6); *Descriptive Inorganic Chemistry* (Chem. 2); Elements of Organic Chemistry (Chem. 4); *German* 8; *Military* 2a, 2b; *Qualitative Analysis* (Chem. 3b).

Second Year

1. German 6; *Military* 2; *Physics* 1, 3; *Quantitative Analysis* (Chem. 5a); *Rhetoric* 2.

2. Physical Chemistry (Chem. 7); Agricultural Chemistry (Chem. 13); Chemical Technology (Chem. 6); *German* 6; *Military* 2; *Physics* 1, 3; *Quantitative Analysis* (Chem. 5b); *Rhetoric* 2.

3. Physical Chemistry (Chem. 7); Agricultural Chemistry (Chem. 13); Chemical Technology (Chem. 6); *German* 6; Iron and Steel Analysis (Chem. 8); *Military* 2; Quantitative Analysis (Chem. 5c); *Physics* 1, 3; *Rhetoric* 2.

Third Year

1. Physical Chemistry (Chem. 7); Metallurgical Chemistry (Chem. 15); Metallurgy (Chem. 14); *Rhetoric* 2; *Seminary* (Chem. 19).

2. Chemistry (Chem. 7); Metallurgical Chemistry (Chem. 15); *Organic Chemistry* (Chem. 9); Proximate Organic Analysis (Chem. 21); *Rhetoric* 2; *Seminary* (Chem. 19); Theoretical Chemistry (Chem. 12).

3. Chemistry (Chem. 7); Metallurgical Chemistry (Chem. 15); *Organic Chemistry* (Chem. 9); Proximate Organic Analysis (Chem. 21); *Rhetoric* 2; *Seminary* (Chem. 19); Theoretical Chemistry (Chem. 12).

Fourth Year

1. Physical Chemistry (Chem. 7); Metallurgy (Chem. 14); Metallurgical Chemistry (Chem. 15); Sanitary Analysis (Chem. 10); *Seminary* (Chem. 19); Special Analytic Chemistry (Chem. 18).

2. Physical Chemistry (Chem. 7); Metallurgical Chemistry (Chem. 15); Proximate Organic Analysis (Chem. 21); *Seminary* (Chem. 19); Special Courses (Chem. 18); *Thesis and Investigations* (Chem. 11).

3. Physical Chemistry (Chem. 7); Metallurgical Chemistry (Chem. 15); Proximate Organic Analysis (Chem. 21); *Seminary* (Chem. 19); Special Courses (Chem. 18); *Thesis and Investigations* (Chem. 11).

APPLIED CHEMISTRY AND ENGINEERING

To meet the needs of those who wish to fit themselves for such work as devolves upon the managers of establishments in which the operations depend upon chemical processes, a four years' course in chemistry with related engineering subjects has been arranged.

REQUIREMENTS FOR GRADUATION

The requirements for graduation, as indicated on pages 93 and 94, are modified as follows: Chemistry, 19; one credit only is required. The electives to be chosen from lists A and B must include chemistry 6, 8, 14, 15; general engineering drawing 1, two subjects listed under "Mathematics," six under "Mechanical Engineering," and three under "Mechanics, Theoretical and Applied."

A thesis is required, and completion of the work leads to the degree of bachelor of science in chemistry and engineering.

COURSE OF INSTRUCTION BY YEARS AND TERMS

The prescribed and chemical electives, together with the engineering subjects necessary to meet the above conditions, are indicated below. Subjects must be taken in the

term indicated, and those in *italics* must be taken in the year indicated.

First Year

1. Drawing, Gen'l Eng'g 1; *General Chemistry* (Chem. 1); *German* 1; Mathematics 3, or 2, 4; Military 1, 2; Physical Training 1.

2. *Descriptive Inorganic Chemistry* (Chem. 2); *German* 1; Mathematics 1 or 2; *Military* 1, 2; Physical Training 1. *Qualitative Analysis* (Chem. 3a).

3. Analytical Geometry (Math. 6); *Descriptive Inorganic Chemistry* (Chem. 2); *German* 8; *Qualitative Analysis* (Chem. 3b); *Military* 2; Physical Training 1.

Second Year

1. Differential Calculus (Math. 7); German 6; *Military* 2; Physics 1, 3; *Quantitative Analysis* (Chem. 5a); *Rhetoric* 2; Shop Practice (Mech. Eng'g 1).

2. Advanced Analytical Geometry (Math. 8); *German* 6; *Military* 5; *Physics* 1, 3; *Quantitative Analysis* (Chem. 5b); *Rhetoric* 2; Shop Practice (Mech. Eng'g 1).

3. *German* 6; Integral Calculus (Math. 9); Iron and Steel Analysis (Chem. 8); *Military* 2; *Physics* 1, 3; *Rhetoric* 2; Shop Practice (Mech. Eng'g 1).

Third Year

1. Analytical Mechanics (Theo. and Appl'd Mech. 1 or 4); Metallurgy (Chem. 15); Metallurgical Analysis and Assaying (Chem. 14); Shop Practice (Mech. Eng'g 2); Special Analytical Chemistry (Chem. 18); *Seminary* (Chem. 19).

2. Chemical Technology (Chem. 6); Industrial Chemistry (Chem. 17); *Organic Chemistry* (Chem. 9); Resistance of Materials (Theo. and Appl'd Mech. 2 or 5); *Seminary* (Chem. 19); Steam Engines (Mech. Eng'g 16); Steam Boilers (Mech. Eng'g 17); Shop Practice (Mech. Eng'g 2).

3. Chemical Technology (Chem. 6); Electrical Engineering 1; Hydraulics (Theo. and Appl'd Mech. 3); Organic Chemistry (Chem. 9); Special Analytical Chemistry (Chem. 18); *Seminary* (Chem. 19); Shop Practice (Mech. Eng'g 2).

Fourth Year

1. Chemistry 14, 15, 18; Thermodynamics (Mech. Eng'g 7).

2. Chemistry 6, 12, 17, 18; Steam Engines (Mech. Eng'g 16); Steam Boilers (Mech. Eng'g 17); *Thesis and Investigation* (Chem. 11).

3. Chemistry 6, 12, 18; Civil Engineering 1; *Thesis and Investigation* (Chem. 11).

PHYSICAL COURSES

CLASSIFICATION OF SUBJECTS

Prescribed

Chemistry 1, 2; 2 credits.
German 1, 8, 6, or French 1, 2, 5; 6 credits.
Mathematics 2 (Advanced Algebra); 1⅗ credits.
Mathematics 4 (Trigonometry); ⅗ credit.
Mathematics 5 (Analytical Geometry); 1 credit.
Mathematics 7 (Differential Calculus); 1 credit.
Mathematics 8 (Advanced Analytical Geometry); 1 credit.
Mathematics 9 (Integral Calculus); 1 credit.
Military Science 1, 2; Physical Training 1; 2 credits.
Physics 1 and 3; 3 credits.
Rhetoric 2; 2 credits.

Elective

List A (Physical)

Physics 5 and 6; 3 credits.
Physics, 7; 3 credits.
Physics 8; 1⅘ credits.
Mathematics 10 (Theory of Equations); 1 credit.
Mathematics 16 (Differential Equations); 1 credit.
Astronomy; 1 to 3 credits.

List B (Chemical-Physical)

Physics 5 and 6; 3 credits.
Physics 7; 3 credits.
Chemistry 3a; 1 credit.
Chemistry 4; 1 credit.
Chemistry 5a; 1 credit.
Chemistry 5b; 1 credit.
Chemistry 12; 1 credit.
Chemistry 7; 1 to 3 credits.

REQUIREMENTS FOR GRADUATION

The foregoing courses have been arranged for those who wish to prepare themselves for special work in physics and allied sciences. In addition to the subjects of the prescribed list, two general lines of work are offered under elective lists A and B, one of which must be taken with the list of prescribed subjects. The advanced theoretical work

of the first of these lines is largely general mechanical physics; that of the second more especially chemical. The laboratory work follows the same lines. The additional studies necessary to complete the forty credits required for graduation may be elected from the various University courses, with the approval of the head of the department of physics.

COURSE OF INSTRUCTION BY YEARS AND TERMS

First Year

1. Advanced Algebra and Trigonometry (Math. 2, 4); German 1; Chemistry 1; Rhetoric 2; Military 1, 2; Physical Training 1.

2. Advanced Algebra (Math. 2); German 1; Chemistry 2; Chemistry 3a or Rhetoric 2; Military 1, 2; Physical Training 1.

3. Analytical Geometry (Math. 6); German 8; Chemistry 2; Chemistry 4, or Rhetoric 2; Military 1, 2; Physical Training 1.

Second Year

1. Physics 1, 3; Differential Calculus (Math. 7); Rhetoric 2; German 6, or Chemistry 5a; Military 1, 2.

2. Physics 1, 3; Advanced Analytical Geometry (Math. 8); Rhetoric 2; German 6, or Chemistry 5b, 12; Military 1, 2.

3. Physics 1, 3; Integral Calculus (Math. 9); Rhetoric 2; German 6, or Chemistry 12; Military 1, 2.

Third Year

Physics 5, 6; Mathematics 10, 16; Astronomy or Chemistry 7; German 6; Electives.

Fourth Year

Physics 7, or Physics 7, 8; Electives.

It will generally be necessary to follow the above, but other arrangements consistent with sequences of course may be made in special cases.

DESCRIPTION OF DEPARTMENTS.

CHEMISTRY

The chemical offerings include courses of instruction in general elementary, inorganic, organic, physical, and theoretical chemistry, and several lines of qualitative and

quantitative analysis. [See *Chemistry*, in DESCRIPTION OF COURSES, p. 174.]

The first year is devoted to the consideration of general descriptive inorganic chemistry and qualitative analysis, and the first two terms of the second year are occupied with general courses in quantitative analysis, both gravimetric and volumetric. The work of these five terms and of two terms of third year, which are devoted to organic chemistry, is prescribed for all students of the chemical courses, and is intended to impart a knowledge of the facts of chemistry, to develop skill and accuracy in manipulation, and to constitute a thoroughly scientific grounding in the fundamental principles and laws of chemistry.

Aside from this prescribed work there are offered numerous electives in chemistry, which, by judicious selection, afford opportunity for specialization along any of the lines of analytical, pharmaceutical, technological, or pure chemistry.

In order that an acquaintance with chemical literature may be had, and to keep pace with the advances in chemistry, students of the third and fourth years are required to take part in the chemical seminary, in which the work consists chiefly of reviews and discussions of assigned articles in current numbers of the various journals.

Two or three terms' work in the fourth year may be devoted to the investigation of some chemical problem. This practice both furnishes an opportunity to specialize along some chosen line and serves as an introduction to the methods of chemical research.

To students who are preparing to become teachers of science opportunity is offered for the acquirement of some experience in supervising laboratory practice in elementary chemistry. The work includes criticism and discussion of methods and application of pedagogical principles and is conducted with the coöperation of the department of pedagogy.

APPLIED CHEMISTRY

In this department there are offered ten separate courses in technological subjects. These require as preliminary work the seven general and analytical courses. They may be further supplemented by special advanced work along some chosen line. Frequent visits are made to metallurgical and other works employing chemical processes.

PHYSICS

The department of physics offers a lecture course in general descriptive physics with class room experiments, extending through the year, and accompanied by an introductory laboratory course in physical measurements. This is followed by two courses, one experimental and the other theoretical. In the experimental course the student is trained in the most exact methods of making the fundamental physical measurements and taught how to discuss his results. The theoretical course running parallel to this discusses, with the aid of elementary calculus, the theory of some of the main subjects of physics. In the senior year the student is supposed to take up some special problem for investigation and to center his laboratory work about that. An advanced mathematical course is also offered for those who wish to follow the most advanced theories and results of the science.

THE MATHEMATICAL GROUP

AIMS

The mathematical group includes the entire offering of the University in pure mathematics, astronomy, and physics, and aims to lay the mathematical foundation for special work in any one of these lines, as well as to offer an opportunity for advanced work. It is hoped that the courses offered will meet the requirements of those who need mathematics as a tool as well as those who wish to make it a specialty.

Parallel to the pure mathematics two lines of associated

work in applied mathematics are offered, namely, in physics and astronomy. Either of these may be taken by the student wishing to graduate from this group. The one leads through the physics of the sophomore year to the mathematical theory of electricity and magnetism, heat, light, and sound; the other through surveying to celestial mechanics and general and mathematical astronomy. In addition to these, a course in astronomy and physics is offered, including the mathematics through the junior year, but leading to theoretical astronomy and advanced physics in the senior year.

CLASSIFICATION OF SUBJECTS

PRESCRIBED

General Engineering Drawing 1, 2; 2 credits.
Mathematics 2, 4, 6, 7, 8, 9, 10, 11, 14, 16, 17; 10⅘ credits.
Military Science 1, 2; Physical Training 1; 2 credits.
Rhetoric 2; 2 credits.

ELECTIVE

List A (Mathematics and Astronomy)

Mathematics 13, 23 or 12, 18, 24; 1⅘ credits.
Mathematics 20, 21, 22, or Astronomy 7, 8, 9; 1⅘ credits.
Mathematics 15 or Astronomy 10.
Astronomy 1, 2, 3, 4; 4 credits.
Physics 1, 3; 2 credits.
Civil Engineering 10; 1 credit.
German 1, 8, 6, or French 1, 2, 5; 6 credits.

List B (Mathematics and Physics)

Mathematics 13, 23, or Mathematics 12, 18, 24; 1⅘ credits.
Mathematics 15, 1⅕ credits.
Physics 1, 3, 5, 6; 6 credits.
German 1, 8, 6, or French 1, 2, 5; 6 credits.

List C (Astronomy and Physics)

Astronomy 7, 8, 9, or Mathematics 20, 21, 22; 1⅘ credits.
Astronomy 4a, 4b, 5, 6; 4 credits.
Astronomy 10; 1⅕ credits.
Physics 1, 3, 5, 6; 5 credits.
Civil Engineering 10; 1 credit.
German 1, 8, 6; 6 credits.

List D

Anthropology 1; 1 credit.
Botany 1 or 6; 1 or 3 credits.
Chemistry 1, 3a, 3b, or 4; 1 or 3 credits.
Economics 1 to 18; 2 to 15⅘ credits.
English 1, 2; 3 credits.
French 1, 5, 2, or German 1, 8, 6; 6 credits.
Geology 1, 3, 4; 1, 2, or 3 credits.
History 1, 2; 1 or 3 credits.
Latin 1, 2, 3; 3 credits.
Library 13; 1 credit.
Mineralogy 1, 2; 1, 2, or 3 credits.
Pedagogy 1 to 7; 1 to 4 credits.
Philosophy 1 to 8; 1 to 4 credits.
Physiology 1 or 4; 1 or 3 credits.
Public Law and Administration 1 to 9; ⅖ to 9⅖ credits.
Psychology 1 to 8; 1 to 4 credits.
Theoretical and Applied Mechanics 1; 1 credit.
Zoölogy 1, 8, 10; 1, 2, or 3 credits.

REQUIREMENTS FOR GRADUATION

To graduate as a bachelor of science in the mathematical group, it is necessary for the student to complete the list of prescribed subjects, together with those of any one of lists A, B, or C of electives, and to present an acceptable thesis. The necessary number of forty full term-credits for University studies may then be made up by election from lists A, B, C, and D.

COURSES OF INSTRUCTION BY YEARS AND TERMS

The studies of the mathematical group may best be taken according to the following outlines of courses in mathematics and physics, in mathematics and astronomy, and in astronomy and physics, respectively.

The electives provided for in the junior and senior years may be readily chosen by a reference to the preceding lists of electives and to the scheme or table of subjects by years and terms.

COURSE IN MATHEMATICS AND PHYSICS

First Year

1. Plane and Spherical Trigonometry (Math. 4); Engineering Drawing 1; French 1 or 5, or German 1, 8; Military 1, 2; Physical Training 1; Rhetoric 2.

2. Advanced Algebra (Math. 2); Descriptive Geometry (Drawing, Gen'l Eng'g 2); French 1 or 5, or German 1, 8; Military 1, 2; Physical Training 1; Rhetoric 2.

3. Analytical Geometry (Math. 6); French 1 or 5, or German 1, 8; Military 2; Physical Training 1; Rhetoric 2; Electives.

Second Year

1. Differential Calculus (Math. 7);Physics 1, 3; French 2, or German 2; Military 2.

2. Advanced Analytical Geometry (Math. 8); French 2, or German 2 or 6; Military 2; Physics 1, 3.

3. Integral Calculus (Math. 9); French 2, or German 2 or 6; Military 2; Physics 1, 3.

Third Year

1. Theory of Equations (Math. 10); Least Squares (Math. 14); Physics 5; Electives.

2. Theory of Determinants (Math. 11); Differential Equations (Math. 16); Physics 5; Electives.

3. Geometry of Space (Math. 17); Differential Equations (Math. 16); Physics 5; Electives.

Fourth Year

1. Modern Geometry (Math. 23) or Invariants (Math. 12); Physics 6; Mathematical Seminary and Thesis (Math. 15); Electives.

2. Theory of Functions (Math. 13) or Higher Plane Curves (Math. 18); Physics 6; Mathematical Seminary and Thesis (Math. 15); Electives.

3. Theory of Functions (Math. 13) or Algebraic Surfaces (Math. 24); Physics 6; Mathematical Seminary and Thesis (Math. 15); Electives.

COURSE IN MATHEMATICS AND ASTRONOMY

The freshman and sophomore years are the same as in the preceding course, except that surveying (C. E. 10) is required in spring term of first year and that astronomy 4a takes the place of physics 1, 3, spring term second year.

Third Year

1. Theory of Equations (Math. 10); Differential Equations (Math. 16); Astronomy 4b; Electives.
2. Theory of Determinants (Math. 11); Differential Equations (Math. 16); Astronomy 5; Electives.
3. Geometry of Space (Math. 17); Least Squares (Math. 14); Astronomy 6; Electives.

Fourth Year*, †

1. Modern Geometry (Math. 23) or Invariants (Math. 12); Astronomy 7; Mathematics 15 or Astronomy 10; Electives.
2. Theory of Functions (Math. 13) or Higher Plane Curves (Math. 18); Astronomy 8; Mathematics 15 or Astronomy 10; Electives.
3. Theory of Functions (Math. 13) or Algebraic Surfaces (Math. 24); Astronomy 9; Mathematics 15 or Astronomy 10; Electives.

ASTRONOMY AND PHYSICS

Freshman and sophomore years the same as before excepting that astronomy 4a is required in the spring term of the sophomore year.

Third Year

1. Theory of Equations (Math. 10); Descriptive and General Astronomy (Astron. 4b); Least Squares (Math. 14).
2. Theory of Determinants (Math. 11); Cosmogony (Astron. 5); Differential Equations (Math. 16); Electives.
3. Practical Astronomy (Astron. 6); Differential Equations (Math. 16); Geometry of Space (Math. 17).

Fourth Year†

1. Theory of Orbits (Astron. 7); Physics 5, 6; Electives.
2. Perturbations (Astron. 8); Physics 5, 6; Electives.
3. Celestial Mechanics (Astron. 9); Physics 5, 6; Electives.

DESCRIPTION OF DEPARTMENTS

ASTRONOMY

The instruction given in astronomy is planned to meet the needs of four distinct classes of students, viz.: (a) those who do not wish to take the time necessary to become thor-

* Mathematics 12, 18, and 24 will be given in 1898–9. †Astronomy 7, 8, and 9 will be given in 1898–1899.

oughly familiar with the facts, principles, and methods of the science, but who desire a general acquaintance with its present state and some idea of how this state has been reached; (b) engineers whose work necessitates a practical knowledge of some parts of it; (c) those students of the college of science who wish to specialize in the geological and biological sciences, and who require a more intimate acquaintance with astronomy than can be got in one term's work; (d) those students who wish to make astronomy their specialty.

In the first courses of instruction the work of the laboratory is subordinated to that of the recitation room, but as soon as the general notions of the science become fixed in his mind, the student is required to take data and solve practical problems in the observatory. After the student has been given sufficient practice to enable him to comprehend and appreciate the more advanced subjects of theoretical astronomy, an opportunity is provided him to familiarize himself with these subjects by the lectures and work of the senior year.

For students of class (a) course 4a, presupposing mathematics through trigonometry only, is offered; for the second, courses 4a and 6, requiring the same preliminary mathematics and a term's experience in practical work with instruments, is given; for the third, courses 4a, 4b, 5, and 6, extending through four terms and requiring the same mathematical preparation as course 4a; and for the fourth class, all astronomical courses from 4a—13, inclusive, are offered. Courses 7, 8, and 9 are to be given in alternate years with 11, 12, and 13. The courses in astronomy 7, 8, and 9, as also 11, 12, and 13, count either as graduate or as undergraduate work, but neither set can count for both. The subjects treated in the astronomical seminary will be related to those considered in courses astronomy 7, 8, and 9 and 11, 12, and 13 respectively.

EQUIPMENT

The equipment of the astronomical department consists of a students' astronomical observatory, containing the following instruments:

An equatorial telescope of 12 inches aperture, the optical parts of which are by Brashear. The instrument was built and mounted by Warner & Swasey. It is provided with graduated circles, driving clock, filar micrometer, a complete set of positive and negative eyepieces, and a dial for setting in right ascension. The construction of the telescope is such that spectroscopic, or photographic, apparatus may be attached without further work on the mechanician's part; a new 4-inch equatorial by Saegmüller with graduated circles, driving clock, and eyepieces, and an old 4-inch equatorial by Newton & Co., to be used in photometric eye estimates; a combined transit and zenith telescope by Warner & Swasey, with the usual micrometer and a number of smaller instruments, such as chronometers, a Riefler clock, an altazimuth, two chronographs, two sextants with mercurial horizons, two small astronomical transits, one of 21 inches focal length and $1\frac{7}{8}$ inches aperture, by Saegmüller, and one of 24 inches focal length and 2 inches aperture, by Newton & Co.; a Green barometer and thermometers, a mier mark, and half a dozen masonry piers for portable instruments for the use of students in practical astronomy.

MATHEMATICS

The courses offered in pure mathematics are so arranged as to meet the needs (a) of those who desire such mathematical knowledge as is necessary to carry on investigation in some line of applied mathematics, and (b) of those who wish to make mathematics a specialty. The instruction is given, for the most part, by the aid of textbooks, but several of the advanced courses are given by lectures with collateral reading. To cultivate a spirit of independent investigation, all senior and graduate students who make mathematics their major, are required to take in

connection with their thesis a year's work (two-fifths study) in the mathematical seminary, where the results of their investigation are presented and discussed. To the seniors and graduate students two lines of work in pure mathematics are offered, and each is given on alternate years. During 1898-99 will be given courses in invariants (Math. 12), higher plane curves (Math. 18), and algebraic surfaces (Math. 24). In the following year will be given modern geometry (Math. 23), and the theory of functions (Math 13).

Courses 10 to 24 (excepting 19) count either as graduate or undergraduate work, but in no case as both.

EQUIPMENT

The department is supplied with eighty-five of Brill's mathematical models. The collection includes an excellent set of plaster models illustrating the properties of surfaces of the second order, a set of string models for ruled surfaces, a set of paper models illustrating the real circular sections of certain conicoids, a complete set of Brill's models for the theory of functions, and a collection of surfaces of third order.

PHYSICS

For a general description of the work of the department and the physical equipment see pp. 84 and 85.

THE NATURAL SCIENCE GROUP

AIMS

The courses of the natural science group are especially intended:

1. To give a thorough liberal education with a basis in the objective sciences.

2. To prepare for the pursuit of specialties in zoölogy, entomology, physiology, botany, or geology as a scientific career.

3. To lay in biological work and study a liberal foundation for a course in medicine.

4. To prepare for the teaching of the natural or physical sciences in high schools and colleges.

Special advantages are offered graduate students for whose work the museums, laboratories, and libraries, and the field and experimental equipment of the University and of the associated State Laboratory of Natural History, furnish an extraordinarily full provision. The University Biological Station, at Havana, is regarded as one of the University laboratories, and work done there by students may receive credit like work in any of the other laboratories.

CLASSIFICATION OF SUBJECTS

PRESCRIBED

Art and Design 1, 2; 2 credits.
Chemistry 1, 3a, 3b or 4; 3 credits.
German 1, 8, 6; 6 credits.
Mathematics 1 to 6; 2 credits.
Military Science 1, 2; Physical Training 1; 2 credits.
Rhetoric 2; 2 credits.

ELECTIVE

*List A** (Major Courses)

Astronomy 4 to 6; 1 to 4 credits.
Botany 1 to 5; 3 to 6, or 9 credits.
Chemistry 5, 7, 9, 12; 3 credits.
Geology 1, 2; 2 to 6 credits.
Mineralogy 1, 2; 1, 2, or 3 credits.
Paleontology 1; 2 credits.
Physics 1, 3; 3 credits.
Physiology 1, 2, 3, 5; 2 to 8 credits.
Zoölogy 1, 2, 3, 4 to 7, 9; 2 to 9 credits.

List B (Minor Courses)

Botany 6 or 1; 1 or 2 credits.
Geology 4 or 1; 1 or 2 credits.
Physics 2; 1 credit.
Physiology 4; 1 credit.
Zoölogy 10a or 2; 1 or 2 credits.

The major and minor courses in lists A and B in this group are respectively the maximum offerings and the minimum requirements in the various subjects of these lists.

*No number of credits in any subject will be accepted as major work other than the numbers specified against that subject in list A. Credit will not be given for both major and minor work in the same subject.

REQUIREMENTS FOR GRADUATION

In the natural science group a student may graduate from either a specialized or a general course.

A specialized course is one containing at least two years of major work in a single subject preceding the senior year, followed by an additional year of major work in that subject, and the writing of an acceptable thesis. No student may be enrolled in a specialized course without the permission of the head of the department in which he wishes to do his principal work. Only those students who pursue a specialized course will, as a rule, be selected for fellowships, scholarships, and other similar University honors. A general course is one in which less than three years' work in any one line is required for graduation, and in which no thesis is required.

Students who specialize in geology or mineralogy may count all work done in these branches and their credits in chemistry in the list of credits required before the beginning of the senior year.

No student may graduate in natural science until he has completed all the required courses, has done at least nine terms' work on one major elective, or twelve terms' work on more than one such major (list A), and has taken at least minor courses in all the other electives in which such courses are offered (list B). The necessary number of forty full term-credits for University studies may be made up by additional elections from any courses offered in the College of Science or in the College of Literature and Arts, the precedent requirements for which the student can meet.

A graduate from a four years' medical course at a school recognized by the University as of high rank may, if a matriculated student, receive for his professional medical studies credits in this group equal to one year's resident study at the University, being thus enabled to obtain his bachelor's degree in science after a three years' University course.

COURSE OF INSTRUCTION BY YEARS AND TERMS

The following list of prescribed studies and major electives shows the terms in which the principal studies of the natural science group must be taken. The prescribed studies, which are in *italics*, must be taken also in the year indicated. Students intending to graduate from a specialized course should begin the study of their special subjects at the earliest time practicable.

FIRST YEAR

1. *Art and Design* 1; *Chemistry* 1; *Military* 1, 2; *Physical Training* 1; Trigonometry (Math. 3); Zoölogy 10, 11.

2. *Chemistry* 3a; *Military* 1, 2; *Physical Training* 1; Advanced Algebra (Math. 1); Zoölogy 1, 2, 3.

3. Analytical Geometry (Math. 6); *Art and Design* 2; Botany 6; *Chemistry* 3b, 4; Entomology, Practical (Zoöl. 8); *Military* 2; *Physical Training* 1; Zoölogy 1, 2.

SECOND YEAR

1. Botany 1; *German* 1; *Military* 2; Mineralogy 1; Physics 1, 3; Zoölogy 1, 3, 5, 10, 11.

2. Botany 1; Embryology (Zoöl. 4); Entomology (Zoöl. 6); Geology 1; *German* 1; *Military* 2; Physics 1, 3; Physiology 1.

3. Botany 1; Entomology (Zoöl. 6); Geology 1; *German* 8; *Military* 2; Physics 1, 3; Physiology 1.

THIRD YEAR

1. Bacteriology (Bot. 2); Botany 3; Entomology, Advanced (Zoöl. 7); Geology 1; *German* 6; Physiology 2; *Rhetoric* 2; Zoölogy 1, 10, 11.

2. Botany 3; *German* 6; Mineralogy 2; Paleontology 1; Physiology 2; *Rhetoric* 2; Zoölogy 4 (Embryology), 5, 6 (Entomology), 7.

3. Botany 4; *German* 6; Mineralogy 2; Paleontology 1; Physiology 2; *Rhetoric* 2; Zoölogy 5, 6 (Entomology), 7, 8.

FOURTH YEAR

1. Thesis (Bot. 5; Geol. 2; Zoöl. 9).

2. Thesis (Bot. 5; Geol. 2; Physiol. 3; Zoöl. 9).

3. Mineralogy 2; Paleontology 1; Thesis (Bot. 5; Geol. 2; Physiol. 3; Zoöl. 9).

SUGGESTIONS AS TO CHOICE OF COURSES

Students who wish to take major courses in several natural science subjects, with the intention of graduating in natural science without a thesis, should take the required subjects of the freshman year together with zoölogy 2; may follow this in the second year with botany 1, German, physics, and military, each throughout the year; may select for the junior year mineralogy 1, to be followed by geology 1, bacteriology or elementary entomology, embryology, general biology, German, minor physiology, and rhetoric 2, finishing geology 1 in the fall term of the senior year, and completing their course by selecting studies amounting to eight elective credits from the remaining subjects open to them. Numerous variations of this course may readily be arranged to the same general effect.

Those who wish to concentrate their major work in zoölogy only should take courses 1, 4, and 5 or 6 in zoölogy, beginning with the second term of the freshman year; minor courses in physiology, physics, and botany in the second year; mineralogy 1 and geology 4 in the third year, and anthropology 1 and thesis investigation during the senior year.

For a zoölogical course with principal reference to entomology, zoölogy 2 may be taken instead of 1, and followed by courses 6 and 7, with the omission of course 4 from the above list.

The student who desires to specialize in physiology should take the subjects precedent to course 1 and follow these with all the physiology offered, except course 4. His work otherwise may be like that suggested above for the zoölogical specialist.

A special course in botany may be made up on lines similar to those of the special zoölogical course by taking, instead of major zoölogy, the botanical courses 1 to 4 in the second and third years, preferably preceded by zoölogy 6 in the freshman year, and followed by botany 5 (thesis work).

Students who desire to make the most of the offerings in geology are advised to take chemistry in the freshman year, begin their mineralogy in the fall term of the sophomore year, take geology in the winter and spring terms of that year and the fall term of the junior year, take mineralogy 2 or paleontology 1 during the winter and spring terms of the junior year, and the remaining subjects together with thesis investigation (geology 2) during the senior year.

SPECIAL COURSE PRELIMINARY TO MEDICINE

To students who wish to select studies leading to a degree in natural science as a liberal preparation for a course in medicine, the following course or its substantial equivalent is recommended:

FIRST YEAR

1. Trigonometry (Math. 3); Chemistry 1; Art and Design or Zoölogy 10*; Military 1, 2; Physical Training 1.
2. Zoölogy 3; Chemistry 2, 3a; Art and Design 2; Military 1, 2; Physical Training 1.
3. Analytical Geometry (Math. 6); Chemistry 2, 3b; Art and Design 2, or Botany 6; Military 1, 2; Physical Training 1.

SECOND YEAR

1. Zoölogy 3; Chemistry 5a; German 1; Military 2.
2. Physics 1, 3; Chemistry 9; German 1; Military 2.
3. Physics 1, 3; Chemistry 9; German 8; Military 2.

THIRD YEAR

1. Physics 1, 3; Physiology 1 or 2; German 6; Rhetoric 2.
2. Physiology 1 or 2; Zoölogy 4; German 6; Rhetoric 2.
3. Physiology 1 or 2; Botany 6; German 6; Rhetoric 2.

FOURTH YEAR

1. Physiology 1 or 2; Bacteriology (Bot. 2); French 5.
2. Physiology 1 or 2; Geology 4; French 5.
3. Physiology 1 or 2; Logic (Phil. 8); French 5.

*To be taken in case zoölogy has not been presented for entrance.

Prospective students in medicine not wishing to graduate here before taking their medical course will be assisted to make up special study lists.

Students in the natural science group of the College of Science will be given credits on their medical courses at the School of Medicine of the University of Illinois for University work taken by them, as follows:

For zoölogy 3; biology.

For physiology 1 and 2; histology and freshman physiology.

For botany 2; bacteriology.

For chemistry 1, 3a and 4; freshman chemistry.

For chemistry 1, 3a and 9, followed by physiology 1; all of freshman and sophomore chemistry except toxicology.

DESCRIPTIONS OF DEPARTMENTS

BOTANY

Seven courses of instruction are offered in this subject —five primarily intended to meet the wants of students making botanical work more or less a specialty, and the others, each occupying a single term, complete in themselves, for students whose chief attention is given to other branches. Three to nine terms' work constitute a major course; a single term, course 6, is offered as a minor course. To a very large extent natural objects are studied rather than books, but constant endeavor is made to introduce students to pertinent existing literature. In the laboratory much use is made of the compound microscope, and special attention is given to its manipulation for best results, and to the preparation of objects. Course 8 is devoted to economic botany.

EQUIPMENT

The botanical laboratories are: One of large size with full equipment of microscopes, microtomes, aquaria, models, charts, etc., for general work; one specially arranged and fitted up for bacteriological instruction and investigation, supplied with sterilizers, thermostats, microscopes, a full line of glassware, metal vessels, and chemicals; one ad-

joining the latter and used in connection with it for vegetable physiology, and having attached a glazed structure, two stories in height, well adapted to facilitate experiments upon living plants and for the growth of specimens required in the laboratories. There are also provisions for private laboratory work by instructors. The department is furnished with a lecture room; a room for the herbarium and facilities for work in connection therewith; work rooms for the preparation of specimens and material; storage rooms for apparatus, utensils, reagents, and materials; dark room for photography; rooms for offices—all in convenient association and provided with the necessary materials and apparatus for ordinary class work and for advanced research.

Special attention has been given to parasitic fungi; and the collections of specimens and of the literature upon the subject are ample for various lines of original investigation.

GEOLOGY AND MINERALOGY

In this department four courses are offered in geology, two in mineralogy and one in paleontology.

For students who wish more than a general acquaintance with these subects, a course covering thirty-six weeks of class room and laboratory instruction has been arranged in geology, a like course in mineralogy, and one of twenty-two weeks in paleontology. A supplementary course of twenty-two to thirty-six weeks is offered those who select a geological subject for a thesis.

Engineers who wish an acquaintance with those portions only of geology which bear most directly on their future work are offered a course of eleven weeks.

To those who desire merely an outline of the most prominent facts and theories of geology, with some idea of the methods by which the geologist arrives at his conclusions, a course of eleven weeks is offered. All these courses are fully described under "Description of Courses," pp. 192, 219, 224.

EQUIPMENT

The department occupies three students' laboratories, an instructors' laboratory, a lecture room, two collection rooms, a store room, a dark room for photography, and a private office.

Apparatus.—The laboratories contain individual desks for forty-eight students, each of which is furnished with reagent bottles, Bunsen burners, and all the other apparatus now considered necessary to a complete outfit for blowpipe work in a first-class laboratory. They are also provided with a spectroscope; two specific gravity balances; an analytical balance; a trip scale; mortars (diamond, agate, wedgwood, and iron); two chemical hoods, each equipped with sink and a complete set of reagents and apparatus for qualitative analysis; a blast lamp and blower, and a muffle furnace; four contact goniometers and two Fuess reflecting goniometers; one Bausch & Lomb and three Fuess lithological microscopes; crystal models (550); thin sections of minerals and rocks (570); an apparatus for cutting and grinding thin sections of rocks, with a Jenney motor; apparatus for micro-chemical analysis; a self-registering barometer; an aneroid barometer and a telescopic hand level for topographic work.

For the recitation room there is a set of Kiepert's physical maps; Ramsay's orographic map of the British Isles; Haart's Alps; Chauvanne's Asia; geological and soil maps of Illinois; a series of geological maps of the United States, representing land development during the successive periods; a set of charts illustrating orography, erosion, deposition of metals, etc.; a series of relief maps; a complete lantern outfit, with microscopic and solar attachment; four hundred lantern slides; an equipment for photography and the manufacture of lantern slides.

Materials.—The collection of fossils comes principally from the paleozoic, but includes a representative series from the higher groups. It contains 43,400 specimens. Six hundred and fifty of the types described in the reports of

the Illinois geological survey are included, and also 200 thin sections of corals and bryozoa.

The collection of minerals contains 7,109 specimens, and that of rocks 2,912 specimens, among which is a large number of polished granites, marbles, and other ornamental building stones.

There is also a collection of Illinois soils containing 76 specimens; and a large collection of Illinois clays with their manufactured products.

PHYSIOLOGY

The special objects of the courses in physiology are as follows: (1) To give to prospective students of medicine a detailed practical knowledge of the normal histological structure and vital processes of the body, and a working familiarity with the instruments of precision used in the investigation of disease. (2) To give to students of all branches of biology a training in deducing logically necessary conclusions from data obtained by their own observations. (3) To furnish such a knowledge of physiology as will serve as a basis for future studies in hygiene.

The laboratory method of instruction is chiefly followed, supplemented, when desirable, by lectures, demonstrations, references to standard literature, and recitations. The laboratory work predominates in the major and advanced courses; the lectures, demonstrations, and recitations in the minor course.

EQUIPMENT

The department of physiology occupies four rooms in Natural History Hall; a general laboratory, a lecture room and a private laboratory on the top floor and an animal room in the basement. The general laboratory, thirty-five by fifty-six feet, is fitted at one end with desks of the most approved pattern for chemical and similar work, and at the other end with heavy tables, especially designed for use with the microscope and other apparatus requiring a stable support.

The department is equipped with a full set of apparatus for lecture demonstration and for laboratory work. Much of this apparatus has been recently imported from Europe and is of the latest and best pattern. Much of it is adapted to the most delicate work of demonstration or research, and is not to be found in the average physiological laboratory. Among such apparatus may be mentioned a Zeiss microspectroscope for work with minute quantities of material—as blood stains in medico-legal investigations; a hæmacytometer of Gowers and of Thoma-Zeiss; Fleischl's hæmometer, DuBois Reymond induction coil, latest pattern; DuBois Reymond myographion with tuning fork and Desprez signal for measuring intervals of less than one-thousandth second; ergograph; Zimmermans-Ludwig's drum kymograph, latest pattern; Fick kymograph; sphymograph (Marey); Fleischl's spectro-polarimeter; Knop azotometer; a Kjeldahl apparatus and a complete set of Hempel's apparatus for gas analysis (technical).

The histological equipment includes a Bausch & Lamb microscope with nosepiece and sub-stage illumination for use of each student, and all the accessory apparatus and reagents for class work or research in histology. There is also a cabinet of histological specimens to which the students have access for study or reference, but the subject is taught with all the details of technique, and the student is required to prepare and examine his own material, and the specimens thus prepared remain his own property, and are of considerable value.

ZOÖLOGY

Zoölogy is taught in eleven courses: Three terms of major work, variously combined to form three courses, primarily for students in the natural science group; a term of embryology for those who have taken one of the preceding courses; five courses in entomology; one to three terms' work in comparative anatomy, zoölogical œcology, or advanced zoölogy for students specializing in that subject, and a year's work in independent investigation (senior) for

those who select a zoölogical subject for the graduating thesis. Only the first term's work is necessarily common to all students in the College who desire to make zoölogical study a prominent feature of their course. At the end of this term three divergent lines are open, one leading mainly toward entomology, a second toward physiology and medical study, and a third toward zoölogical specialties and pedagogical zoölogy.

EQUIPMENT

The equipment of the zoölogical department is contained in four students' laboratories, an instructor's laboratory, a lecture room, a private office, a store room, and a dark room for photography. It includes twenty aquaria, forty-eight compound microscopes of the best makes (Zeiss, Reicherts, Leitz, and Bausch & Lomb), Zeiss dissecting microscopes, Abbé camera-lucidas, microtomes of five patterns (Zimmerman's Minot, Cambridge, Beck-Schanze, Bausch & Lomb, and Ryder), and the usual equipment of incubators, paraffin baths, etc. A set of Blaschka glass models of invertebrates, a set of Ziegler's wax models of embryology, two hundred and fifty wall charts, and some hundreds of permanent preparations in alcohol, are examples of the equipment for the illustration of lectures. Advanced and graduate students have the privilege of the free use of the library and equipment of the State Laboratory of Natural History, which occupies rooms in Natural History Hall. They are also admitted to the privileges of the University Biological Station, at Havana, Illinois, and will be given credit for regular work done there. They are thus afforded ample opportunity for prolonged original work in several departments of zoölogical science, especially in those relating to the zoölogy of Illinois. The Bulletin of the State Laboratory is open to graduates for the publication of their papers.

Entomological students have similar access to the collections and resources of the State Entomologist's office, including a well-equipped insectary for experimental investigation.

THE PHILOSOPHICAL GROUP

AIMS

The philosophical group includes those sciences which deal both with man as an individual, in the mental and moral spheres, especially as these are connected with his physical being, and also with man in society. The branches of knowledge included in the group occupy a place among the divisions of biological science, and it is intended to carry the spirit of biology, in the commonly accepted sense, into the investigation of these subjects. The general purpose of the group is the study of the character and development of the individual and of society, of the relations of man to external nature, of the influence of natural selection on social development, and, finally, of the possible effect of artificial selection on that development, through both subjective and objective influences.

Under this caption the subjects of psychology, pedagogy, economics, public law and administration, and philosophy are offered in the College of Science as electives to all chemical and natural science students, and to all students who desire to specialize in the philosophical subjects, with studies in the physical and natural sciences as a preparation for them. All the studies of this group are junior and senior subjects.

CLASSIFICATION OF SUBJECTS

PRESCRIBED

The same as in either the natural science or chemical and physical group, pp. 90 and 107.

ELECTIVE

List A (Major Courses)

Economics 1 to 18, 101, 102; 1 to 17⅘ credits.
Pedagogy 1 to 7; ⅘ to 9⅘ credits.
Philosophy 1 to 7; 1 to 6 credits.
Public Law and Administration 1 to 9; ⅘ to 9⅘ credits.
Psychology 1 to 9; 1 to 9 credits.

List B (Minor Courses)

Economics 1; 2 credits.
Philosophy 1; 1 credit.
Public Law and Administration 1; 1⅕ credits.
Psychology 1; 1 credit.

REQUIREMENTS FOR GRADUATION

In this group, as in the natural science group, a student may pursue either a specialized or a general course.*

To graduate from the College of Science in the studies of this group, in a general course, the student must either complete the subjects of the prescribed list in the chemical group,† or must carry those of the corresponding list in the natural science group‡ and earn six full credits additional for major natural science studies, three of which must be biological. He must further do twelve terms' major work, or their equivalent, on subjects in the philosophical group; must take minor courses in all the philosophical subjects (except pedagogy) in which he has not completed a major course.

To graduate from this group in a specialized course the student must meet the general requirements for specialized courses, relating to thesis and amount of work required in the major subject.

Those who specialize in psychology may count all credits gained in that department, and any three earned previous to the senior year in anthropology, botany 1 b, c; physiology 4; philosophy 1, 6, 8, 9, 10; zoölogy 3; economics 6.

DESCRIPTION OF DEPARTMENTS

ECONOMICS

The instruction in this subject is based on the work of the first two years in science. The relation of the study to the biological sciences, commonly so called, is emphasized and kept steadily in view. In the courses in sociology the aim is to trace the evolution of society from primitive forms

*See pages 54, 55. †See page 90. ‡See page 107.

to its present complex structure, to examine the nature of its environment and its adaptation thereto, its present normal character and operations, and the forces, subjective and objective, which are at work tending to change its structure.

PEDAGOGY

See same, in the College of Literature and Arts, page 64.

PHILOSOPHY

The work in this department includes history of philosophy, metaphysics, ethics, and logic. The object of the courses is primarily threefold:

1. To meet the wants of those who desire to specialize.
2. To give those who desire a more general knowledge of these subjects some familiarity with the sphere of philosophical speculation and with the philosophical method as applied to the principles and presuppositions of the various sciences.
3. To show the relation of philosophy to practical life and the value of these studies as means of general culture.

PUBLIC LAW AND ADMINISTRATION

See same, in the College of Literature and Arts, page 64.

PSYCHOLOGY

The object of this department is twofold. The aim is, first, to acquaint the student experimentally with psychic phenomena and to make him familiar with recent literature and standard authorities; and, second, to make contributions to the science itself.

For the suitable preparation of the student for higher work, he is from the first required to deal with the subject as an experimenter, and thus given a practical knowledge of the phenomena which he is to handle. The laboratory is well equipped with materials and apparatus for the continuation of this work through a large number of classical experiments upon sensation, which the student is required to conduct himself and of which a careful record is kept.

The higher mental functions are then studied in a similar way, and the experimenter held responsible for the purity of the experimental conditions and the method of procedure. As a preparation for this, scientific methods and the logic of experimentation are made special objects of study. The history of psychology is also taken up. A full line of periodical literature is made accessible by the University, and this serves as the basis of reports in the seminary. In order to give a comprehensive survey of psychic activities, the genesis of mind with its accompanying development of neural structure is traced from the lower forms of life to its culmination in adult man.

For the accomplishment of the second aim of the department, that of original research, the laboratory is well equipped with suitable apparatus and every incentive is given toward a high grade of work. Investigations not immediately connected with the laboratory are also encouraged. The plan of this higher work is formed on a coöperative basis so that each investigator not only receives the assistance of his fellow students, but is also allowed to participate in their work.

COLLEGE OF AGRICULTURE

FACULTY

ANDREW S. DRAPER, LL.D., PRESIDENT.
EUGENE DAVENPORT, M.AGR., DEAN, Animal Husbandry.
THOMAS J. BURRILL, PH.D., LL.D., Botany and Horticulture.
STEPHEN A. FORBES, PH.D., Zoölogy.
CHARLES W. ROLFE, M.S., Geology.
DONALD MCINTOSH, V.S., Veterinary Science.
ARTHUR W. PALMER, SC.D., Chemistry.
FRANK F. FREDERICK, Art and Design.
SAMUEL W. PARR, M.S., Applied Chemistry.
DANIEL H. BRUSH, CAPTAIN 17TH INFANTRY, U.S.A., Military Science.
ALBERT P. CARMAN, SC.D., Physics.
EVARTS B. GREENE, PH.D., History.
GEORGE T. KEMP, PH.D., M.D., Physiology.
EDGAR J TOWNSEND, PH.M., Mathematics.
WILLIAM H. VAN DERVOORT, M.E., Mechanical Engineering.
HARRY S. GRINDLEY, SC.D., SECRETARY, Chemistry.
HERMAN S PIATT, A.M., French.
ARTHUR HILL DANIELS, PH.D., Philosophy.
CHARLES W. TOOKE, A.M., Public Law and Administration.
FRANK SMITH, A.M., Zoölogy.
PERRY G. HOLDEN, M.S., Agricultural Physics.
VIOLET D. JAYNE, A.M., English.
OSCAR QUICK, A.M., Physics.
EDWARD J. LAKE, B.S., Art and Design.

WILBER J. FRASER, B.S., Dairying.
JOSEPH C. BLAIR, Horticulture.
AGNES S. COOK, A.B., Rhetoric.
ARTHUR C. HOWLAND, PH.D., History.
CHESTER H. ROWELL, PH.B., German.
JOHN P. HYLAN, PH.D., Psychology.
CHARLES F. HOTTES, M.S., Botany.
M. B. HAMMOND, PH.D., Economics.
ALBERT R. CURTISS, Woodworking.
HENRY JONES, Blacksmith.

AIMS AND SCOPE

The College of Agriculture aims at the higher education of the rural people and their elevation both in a business and in a social sense. It believes that civilization is the fruit of labor as well as of thought; that thought is most healthy in an active body, and that in the future, as in the past, development will come largely through those who intelligently labor.

It believes that every man needs two educations; one that is technical, to fit him for business, another that is cultural, to fit him to live; one to make him efficient and independent as to means of support, the other to develop and to train his better faculties; one to insure comfortable existence, the other to make the most of that existence. This College attempts to secure both of these for the young land owner, believing that neglect of one leads to incompetency and distress, while the want of the other dwarfs the individual and prevents his greatest usefulness. In other words, it seeks to provide that education which shall best serve the needs of a rural people living in a cultured nation and under a free government.

The strictly technical portion is essentially a course in applied science. It constitutes about one-fourth of the course, and the aim is not so much to develop and teach rules of practice as to discover the principles and to establish the laws of agricultural science. Of the remaining

three-fourths of the course more than half is prescribed in the sciences. This is both for their own sake and to fortify the technical work of the course. Because of this and because the subject-matter and the methods of the technical portion lie so fully within the domain of science, the course is essentially scientific rather than literary, and it is believed that the sciences afford a favorable field for the development of the higher faculties of the mind. Yet the College is mindful of the fundamental character of history, literature, and economics as training studies, and reasonable attention to these subjects is required.

To insure breadth of training still further and to afford latitude for individual preference in culture studies, nine full term-credits are left elective. These electives may be used to extend either the technical or the cultural features of the course, but the latter is encouraged and advised. Under this elective privilege almost any University work will be accepted for credit, but as the privilege is continuous in one study after the freshman year, it is desired that electives be chosen by courses, and so far as possible directed to definite ends.

METHODS OF INSTRUCTION

Instruction is by laboratory work, supplemented by text-books, lectures, and reference readings, which are almost constantly assigned from standard volumes and periodicals. Laboratory methods of study are regarded as peculiarly suited to the subjects of this course and the needs of its students, and a liberal equipment has been provided for students' use and for purposes of illustration.

EQUIPMENT

The equipment for the technical work of the course is increasing rapidly. The department of agricultural physics is fitting out one of the best laboratories in the West for investigation in soil physics and in mechanical analysis of soils. The dairy department is equipped with a plant for laboratory work in testing, pasteurizing, separating,

creaming, and churning; also for investigation in dairy bacteriology.

For illustration and practice in expert judging, the College owns a stud of Morgan horses, herds of Jersey, Shorthorn and Holstein-Friesian cattle and a choice flock of Shropshires.

The department of veterinary science is provided with a model of the horse in *papier maché*, capable of dissection into nearly one hundred parts. There are also natural specimens illustrating nearly every disease of bone to which the horse is subject.

The College makes free use of the extensive fields, orchards, and gardens in which the Agricultural Experiment Station conducts experiments in methods of culture, effect of various practices upon yield and upon fertility, varieties of fruits, vegetables, and forage crops from corresponding latitudes in various parts of the world. The methods employed and the results secured are freely used for instruction. This is the more readily accomplished because for the most part the instructors are also in charge of the experiments.

The ornamental grounds which surround the University buildings contain about twenty acres, and are kept neat and attractive. These, with their trees and flowering shrubs, lawns, beds of flowers and foliage plants, walks and drives of different construction and styles, furnish illustrations for the classes in landscape gardening. A greenhouse contains a collection of plants of value to the classes in floriculture and landscape gardening.

The cabinets contain a series of colored casts of fruits, enlarged models of fruits and flowers, collections of seeds of native and exotic plants, of specimens of native and foreign woods, of beneficial and injurious insects, and of specimens showing their work; numerous dry and alcoholic specimens and preparations; photographs, maps, charts, diagrams, drawings, etc.

The college has a supply of compound microscopes and other apparatus, and students have opportunity to learn

their use and to make practical investigations with them. The herbarium is rich in specimens of useful and noxious plants, including many of the fungous parasites which cause disease to cultivated crops.

Agriculture is beginning to have a literature, and the library contains a large collection of works on agriculture by standard authors in English, French, and German; also reports of agricultural departments of this and other countries, journals of agricultural societies, both in America and abroad, besides nearly all the standard agricultural periodicals of the United States and many from Europe and Australia. The student not only has free access to this literature, but is constantly assigned reference readings as a part of his class work.

In other work than the purely technical, the agricultural student meets the same instructors and enjoys the same privileges as other students of the University, and in all departments the laboratory method is freely employed, in which the student uses apparatus with his own hands and consults the literature of the subject at every step.

CLASSIFICATION OF SUBJECTS

PRESCRIBED

Agriculture 1a, 1b, 2a, 2b, †3, 4, †5, 6, 9; 6 or 8 credits.
Art and Design 1; 2 credits.
Botany 1, 2, 8; 5 credits.
Chemistry 1, 3a, 4; 3 credits.
English 1; 1⅓ credits.
Horticulture 1a, 1b, 1c, *4, *5, *6, *7, *8, *10; 1⅔ or 6⅔ credits.
Military 1, 2; Physical Training 1; 2 credits.
Physiology †1; 2 credits.
Rhetoric 2; 2 credits.
Thesis; 2 credits.
Veterinary Science †2; 1 credit.
Zoölogy 3, 8; 3 credits.

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*, † Subjects marked with a dagger may be taken instead of those marked with a star, and *vice versa*.

ELECTIVE

Agriculture 7, 8, 11; 3 credits.
Anthropology 1; 1 credit.
Astronomy 4; 1 credit.
Biology, General; 1 credit.
Botany 3, 4, 5; 6 credits.
Chemistry 5b, 5c, 13; 5 credits.
Economics 1 to 18; 1 to 5⅘ credits.
English 1, 2; 3 credits.
French 5; 3 credits.
Geology 4, 1; 1 or 2 credits.
German 1, 8, 6; 3 to 6 credits.
History 1, 2, 3, 4, 7, 10 to 12; 1⅕ to 9 credits.
Horticulture 2, 3, 9; 3 credits.
Mathematics 1, 3; 2 credits.
Mechanical Engineering 1, 2; 1 to 4½ credits.
Mineralogy 1; 1 credit.
Paleontology 1; 2 credits.
Philosophy 1, 5; 2 credits.
Physiology 2, 3; 5 credits.
Physics 1, 3; 1 to 3 credits.
Public Law and Administration 1, 2, 4 to 8; ⅘ to 7⅗ credits.
Psychology 1, 3, 6; 2 credits.
Veterinary Science 1, 2, 3; 6 credits.
Zoölogy 4, 5; 4 credits.

REQUIREMENTS FOR GRADUATION

The degree of bachelor of science is conferred upon the presentation of an acceptable thesis after the completion of the prescribed subjects and nine elective full term-studies.

The following scheme affords an outline of the possible courses and exhibits, the years and terms in which the prescribed subjects may be most conveniently taken:

If the student has entered without botany or zoölogy, one or both, he will need to take as an elective botany 6 or zoölogy 10, preparatory to the prescribed work in botany and zoölogy.

COURSE OF INSTRUCTION BY YEARS AND TERMS

First Year

1. Agriculture 2a; Horticulture 1a; Art and Design 1; Chemistry 1; Military 1, 2.
2. Agriculture 9; Horticulture 1b; Art and Design 1; Chemistry 3a; Military 1.
3. Agriculture 2b; Agriculture 1a; Horticulture 1c; Chemistry 4; Military 2.

Second Year

1. Agriculture 1b; Botany 1; Military 2; Rhetoric 2; Horticulture 2, 9, or Elective.
2. Zoölogy 3; Botany 1; Military 2; Rhetoric 2; Horticulture 3, 9, or Elective.
3. Agriculture 4; Botany 1; Military 2; Rhetoric 2; Horticulture 2, 9, or Elective.

Third Year

1. Agriculture 6; Zoölogy 3, or Horticulture 4, 5; English 1; Elective.
2. Botany 8; Physiology 1, or Horticulture 6; English 1; Elective.
3. Zoölogy 8; Physiology 1, or Horticulture 7; English 1; Elective.

Fourth Year

1. Agriculture 3, or Horticulture 8, 10; Botany 2; Elective.
2. Veterinary Science 2, or Horticulture 8, 10; Thesis; Elective.
3. Agriculture 5, or Horticulture 8, 10; Thesis; Elective.

WINTER SCHOOL IN AGRICULTURE

For the winter term students are admitted without entrance examination to a special short course in which are daily lectures and class exercises on some of the most important practical branches of agriculture, horticulture, and veterinary science. This course is designed for young men already engaged in agricultural pursuits who cannot spend a long time in college, and yet are anxious to make the most of themselves and of their vocation. Such students have

access to the library and museum collections of the University, and have admission to the courses of general lectures.

The details of this course vary from year to year. A special circular giving full information concerning it is issued each year several weeks before the opening of the winter term.

STATE LIBRARY SCHOOL

FACULTY

ANDREW S. DRAPER, LL. D., PRESIDENT.
KATHARINE L. SHARP, PH. M., B. L. S., DIRECTOR, Library Economy.
MARGARET MANN, Cataloguing.
MAUDE W. STRAIGHT, A. B., Reference and Bibliography.

AIMS AND SCOPE

The *Library School,* which had been conducted at Armour Institute of Technology, Chicago, since September, 1893, was transferred to the University of Illinois in September, 1897.

The scope of the work of the school has been broadened since the time of the transfer. There is now offered a four years' course of study, leading to the degree of bachelor of library science. Two years of the course are devoted to general university studies, and this is the smallest preparation which will be accepted for entrance upon the technical work. Students are encouraged to complete a four years' college course before applying for admission. This high standard is necessary because conditions in library work are rapidly changing. It is not enough to have a knowledge of books, nor is it enough to have a knowledge of methods. One or two years of training will not take the place of years of experience, but they will make the student more adaptable and general library service more intelligent.

Instruction is given in each department of library administration. Stress is laid upon simplicity and economy, although elaborate methods are taught to enable students

to work in large libraries where bibliographic exactness is required. The higher side of library work is emphasized throughout the course, and students are taught their responsibility to the schools, to the clubs, to the factories, to university extension, and to the people as organized bodies and as individuals.

It is the purpose of the University to graduate librarians who are not only trained, but educated; librarians who are not only equipped in technical details, but filled with an appreciation of their high calling to furnish "the best reading to the greatest number at the least cost."

The school offers a course of twelve lessons, open to all students of the University, on the use of the library and the ordinary reference books.

METHODS OF INSTRUCTION

There are so few text-books on library economy that instruction is given almost altogether by lecture and laboratory methods. References to books and periodicals are given for collateral reading, and individual research is encouraged from the start. Lectures are illustrated by the collections of forms and fittings and each student is expected to do a certain amount of practical work in the University library each day. Before completing the course, each student must have had actual experience in every department of the library. Class room work is tested by problems, and examinations take the form of problems wherever practicable.

EQUIPMENT

The most valuable equipment is the working library of the University.

The Library School has the complete collection of manuscript notes and problems which have been prepared since the school opened in 1893. As text-books are so few, this collection is invaluable. A collection of library reports and catalogues and of mounted samples, showing methods of administration in all departments, is carefully

classified and is continually increasing. A collection of card catalogues of various forms has been made, including the book forms from Leyden, Holland; Cassel, Germany; and Florence, Italy; the Rudolph indexer and the modern forms approved by the American Library Association. Other forms are represented by photographs.

The school has a collection of printed blanks and forms illustrating methods of administration in different types of libraries, many labor-saving devices, and samples of fittings for all departments. The school received much material from the World's Columbian Exposition in 1893, and is continually receiving additions from librarians and manufacturers throughout the country.

A collection of cataloguing rules and of classification systems is making for comparative study. A number of devices and patents, such as temporary binders, pamphlet cases, newspaper files, etc., have been contributed by inventors and manufacturers.

REQUIREMENTS FOR GRADUATION

Twenty University credits, which may include military (for men) and physical training (for women), in addition to two years' prescribed technical library work, are required for graduation. The technical work is of junior and senior grade and must be taken at the University, but the work of the first two years covers general university studies and may be taken at any college from which credits are accepted.

COURSE OF INSTRUCTION

Required for the degree of B.L.S.

The work of the first two years may consist of any of the courses offered in the University, the requirements for which students can meet.

THIRD YEAR

1. Elementary Library Economy (Lib. 1); Elementary Reference (Lib. 2); Elementary Bibliography (Lib. 3); Selection of Books (Lib. 4); Elementary Apprentice Work (Lib. 5).

2. Elementary Library Economy (Lib. 1); Elementary Reference (Lib. 2); Elementary Bibliography (Lib. 3); Selection of Books (Lib. 4); Elementary Apprentice Work (Lib. 5).

3. Elementary Library Economy (Lib. 1); Elementary Reference (Lib. 2); Selection of Books (Lib. 4); Elementary Apprentice Work (Lib. 5).

FOURTH YEAR

1. Advanced Library Economy (Lib. 6); Advanced Bibliography (Lib. 7); History of Libraries (Lib. 8); Advanced Reference (Lib. 9); Selection of Books (Lib. 4); Advanced Apprentice Work (Lib. 11).

2. Advanced Library Economy (Lib. 6); Advanced Bibliography (Lib. 7); Advanced Reference (Lib. 9); Book-making (Lib. 10); Selection of Books (Lib. 4); Advanced Apprentice Work (Lib. 11).

3. Advanced Library Economy (Lib. 6); Advanced Bibliography (Lib. 7); History of Libraries (Lib. 8); Thesis (Lib. 12); Selection of Books (Lib. 4); Advanced Apprentice Work (Lib. 11).

SCHOOL OF MUSIC

FACULTY

ANDREW S. DRAPER, LL. D., PRESIDENT.
WALTER HOWE JONES, DIRECTOR OF SCHOOL, Piano.
ALISON MARION FERNIE, R. A. M. (London), P. A. M. (Philadelphia), Voice.
ALICE PUTNAM, Violin.
JESSIE YOUNGE FOX, Piano.

AIMS AND SCOPE

The School of Music offers courses leading to the degree of bachelor of music.

The courses are widely varied. Regular courses are laid out, although students may spend an indefinite amount of time in the study of an instrument or of the voice.

The course in the history of music, as well as the work in the University Orchestra and the University Oratorio Society, may be taken by regular students in other departments.

A course of artists' concerts is given each season under the management of the School of Music. In these concerts, to which an admission fee is charged, only artists of the best reputation appear.

The instructors in the School of Music give recitals and lectures on musical subjects during the year.

REQUIREMENTS FOR GRADUATION

Forty full term-credits, including military and physical training, together with an acceptable thesis, are required for graduation with the degree of bachelor of music. Every

student must take the prescribed subjects. The thesis required for graduation must be on a topic related to music.

Students who are not working for a degree in music may receive a certificate of work done by complying with the following conditions:

Students of the piano, organ, or violin must complete the entire course specified for these instruments; must also complete the work offered in harmony, covering four terms, and must take one year's work (3 credits) in either German or French.

Students of the voice must complete the entire course offered in vocal work, the four terms' work in harmony and one year's work on the piano, besides taking one year (3 credits) of German or French, and one year (3 credits) of Italian.

Special and preparatory music students are required, in addition to their practical work in music, to pursue other lines of study sufficient to fill in their spare time.

Students enrolled in the department of music only pay no term fees, but must pay the music fees. (See p. 264.)

CLASSIFICATION OF SUBJECTS

PRESCRIBED

Music 1; 3/5 credit.
Music 2a; 4 credits.
Music 2b; 1 credit.
Music 2c; 1 credit.
Music 2d; 1 credit.
Music 3b, 4b, 5b or 6b; 17 credits.
French or German; 3 credits.
Italian 1; 3 credits.
Mathematics 4; 3/5 credit.
Military 1, 2; Physical Training 1; 2 credits.
Physics 1; 1 4/5 credits.
Rhetoric 1; 2 credits.

The remaining credits may be obtained in electives offered in the College of Literature and Arts, choice of subjects being left to the individual student.

MUSICAL ORGANIZATIONS

The University Glee Club is an organization for men. Membership is decided by competition and is limited to sixteen in number. The club meets twice a week for rehearsal and is under the direction of the head of the school of music.

The Young Ladies' Glee Club is an organization for the young ladies of the University, and is in charge of the vocal department.

The Mandolin and Guitar Club is open to young men who play these instruments. Membership is decided by competition, and the club is associated with the Glee Club in its concerts.

The Military Band is conducted by the head of the school of music. It furnishes music for important University occasions and appears at battalion drill of the military department, besides giving several concerts during the year.

The University Orchestra meets for a two hours' rehearsal once a week, and is open to all students who play any orchestral instrument ordinarily well.

The University Oratorio Society meets once a week for rehearsal of choral works, especially oratorio choruses. Membership is free to students. Singers not connected with the University are admitted on the payment of a small fee.

GRADUATE SCHOOL

ORGANIZATION

The Graduate School is in charge of the Council of Administration of the University. The Dean of the General Faculty is the executive officer of the school, and he should be consulted on all matters pertaining thereto.

ADMISSION AND REGISTRATION

Graduates of the University of Illinois, and of other colleges and universities of approved standing, may be admitted to membership in the Graduate School upon presentation of their credentials. Other persons suitably qualified may gain admission by special vote of the Council of Administration upon such conditions as may be imposed in each case. Candidates for admission register with the Dean of the General Faculty at the beginning of each academic year, during the registration period preceding the commencement of instruction for the year in the University.

Non-residents may register by securing blanks, which are sent on application, and returning them properly filled out not later than the time specified. Correspondence in this case should be commenced early, that no delay in registration may occur.

Registration may be accepted at other times, but the time-limit required for degrees counts from the date of registration. In all cases one registration covers an academic year or such fractional part thereof as then remains. A graduate student who desires to be absent from the University during any part of the year for which he is registered must obtain from the Dean of the General

Faculty a certificate of permission covering the period of absence.

Admission to the Graduate School is indicated by a certificate issued to each successful candidate by the Dean; this certificate must be presented to the Business Manager for his signature, and, if the holder is not already matriculated in the University, must be accompanied by the required fee. The certificate, properly signed, is to be shown to the head of each department in which instruction is sought.

With the exceptions named below, all members of the Graduate School are required to be in regular attendance at the University, and to do all the work for which they are registered in the departments to which such work belongs. In case of absence on leave, or when absence is necessary to carry on investigations included in approved courses of study, the requirement of continuous residence may be modified by the Council of Administration. Graduates from baccalaureate courses of this University may register as non-resident members of the Graduate School; and all members of the School who have completed the residence period required for advanced degrees may register as non-residents while completing the work required for such degrees.

STUDIES AND EXAMINATIONS

As far as can be indicated by a statement of time, full work for a graduate student consists in the use of forty-five hours a week in the lecture rooms, laboratories, etc., and in private study. Assignments of work are made upon this basis; but great variations naturally result from the subject-matter in hand, and from the abilities of individuals. Each student must select one principal line of study, called his major subject, and upon this major subject at least one-half of his work must be done; and any greater proportion of his time, up to the whole of it, may be thus devoted if proper approval is had. When work upon the selected major subject is not arranged to require all of the student's attention, he must choose one or two minor subjects, as may be

necessary to complete a full course of study. Usually, at least one minor subject should be taken. Not more than two may be taken at the same time.

The major study must be approved as graduate work for this University. The minor subjects may, under approval, be chosen from the offerings to graduates, or, except in the College of Engineering, from undergraduate courses exclusive of those usually open to freshmen. But all candidates for advanced degrees must direct their selection toward some well-defined end, determined for the most part by the character and purpose of the major study.

In architectural and engineering subjects, at least the major line of study and not less than two-thirds of the entire work must be taken from lists marked "primary,"* and any remaining amount to complete a full course may be taken from those designated "secondary," under the same head with the primary list.

All courses of study leading to degrees in the Graduate School are subject to approval, first, by the head of the department of the University in which the major subject for each student belongs; second, by the Dean of the College including such department; and, third, by the Dean of the General Faculty. The latter officer reports to the Council of Administration for final action. The signatures of the heads of departments in which chosen minor subjects belong must also be obtained before the list reaches the Dean of the General Faculty. The lists of studies, as finally approved, are deposited with the Registrar of the University. No changes may subsequently be made except under the same line of approvals, but extension of time may be arranged with the professors concerned and with the Dean of the General Faculty.

Examinations are required in all subjects, and reports upon these are made to the Registrar of the University. Graduate students in undergraduate classes are examined with these classes.

*See the courses for graduates in architecture and other engineering courses, in the "General Description of Courses," pp. 166, 182, 189, 216, 221.

The head of the department in which the student does his major work is charged with the direction and supervision of such major work, and, in a general way, with the supervision of the student's entire course of study. He fixes the time and method of all examinations not otherwise provided for, sees that they are properly conducted, and reports results to the Registrar. It is his duty also to keep the Dean of the General Faculty informed concerning all matters affecting the interests of the student, and of the School in connection therewith.

DEGREES AND FELLOWSHIPS

A full statement regarding the degrees conferred by the University may be found on later pages of this catalogue, and in the same connection an account of fellowships. (See pp. 241, 245.)

SCHOOL OF LAW

FACULTY

ANDREW S. DRAPER, LL. D., PRESIDENT OF THE UNIVERSITY, ACTING DEAN.
GEORGE E. GARDNER, A. M., Professor of Law.
CHARLES C. PICKETT, A. B., Professor of Law.

LECTURERS

Honorable OLIVER A. HARKER, of the Appellate Court of Illinois, Lecturer on Criminal Law, Assignment for the Benefit of Creditors, and Mechanics' Liens.
Honorable CHARLES G. NEELY, of the Circuit Court of Cook County, Lecturer on the Preparation for and Conduct of Trials.
Honorable BENJAMIN R. BURROUGHS, of the Appellate Court of Illinois, Lecturer on the Law of Real Estate.

METHODS OF INSTRUCTION

The methods of instruction as used in this school are based largely on the study of cases. Text-books are used to some extent and lectures are occasionally resorted to, but the study of the case is regarded as the chief means to the attainment of legal knowledge and proficiency.

REQUIREMENTS FOR ADMISSION

1. All applicants for admission to the School of Law must be at least 18 years of age and of unquestioned character.

2. Graduates of colleges and scientific schools of approved standing and all persons who present credits for a

year's work at such institutions, are admitted upon diploma or certificate without examination.

3. Graduates of fully accredited high schools are admitted in the same way. A fully accredited high school is one whose graduates are admitted to the University without examination.

ADVANCED STANDING

The following persons will be admitted to advanced standing:

1. Persons who produce from another law school in good standing certificates of having satisfactorily pursued courses in law and received credit thereof.

2. Persons who have studied law privately or in an attorney's office and pass examinations prescribed by the faculty of the School.

3. Members of the bar of the State, who will be admitted to the third year class without examination as candidates for the degree of LL.B.

SPECIAL STUDENTS

Students who do not desire to be candidates for a degree may take one or more courses as special students upon approval of the faculty of the School under regulations to be prescribed. Such students will receive credit for work satisfactorily done, and may become candidates for graduation at any time by meeting the requirements of the School.

LEGAL STUDY AND UNIVERSITY WORK

The Council of Administration will, upon application, in proper cases, apply credits earned in the School of Law upon other University courses.

Students matriculating in the School of Law may take any of the following courses in the College of Literature and Arts, subject to the approval of the instructors having such courses in charge, and of the instructors in the School of Law: Public law and administration; economics and social science, history, and early English legal codes. By special

arrangement other work in the College of Literature and Arts may also be taken.

COURSE OF INSTRUCTION

FIRST YEAR

Contracts (Law 1).—Fall, winter, and spring terms, four hours, three hours, and two hours respectively. Professor PICKETT.

Torts (Law 2).—Fall, winter, and spring terms, three hours, two hours, and three hours respectively. Professor GARDNER.

Real Property (Law 3.)—Fall, winter, and spring terms, three hours each. Professor GARDNER.

Domestic Relations (Law 4).—Winter term, two hours. Professor PICKETT.

Criminal Law (Law 5).—Spring term, two hours (supplementing Judge Harker's lectures). Professor PICKETT.

SECOND YEAR

Evidence Law (Law 6).—Fall, winter, and spring terms, three hours each. Professor GARDNER.

Sales (Law 7).—Fall and winter terms, two hours each. Professor PICKETT.

Real Property (Law 8).—Fall term, two hours (continuing Real Property, Law 3). Professor GARDNER.

Pleadings (Law 9).—Fall term, three hours. Professor PICKETT.

Agency (Law 10).—Winter term, three hours. Professor PICKETT.

Damages (Law 11).—Winter term, two hours. Professor GARDNER.

Bailments (Law 12).—Spring term, five hours. Professor PICKETT.

Guaranty and Suretyship (Law 13).—Spring term, two hours. Professor GARDNER.

THIRD YEAR

Equity (Law 14).—Fall and winter terms, four hours each. Professor PICKETT.

Corporations (Law 15).—Fall and winter terms, four hours and two hours respectively. Professor GARDNER.

Commercial Paper (Law 16).—Fall and winter terms, two hours each. Professor PICKETT.

Wills (Law 17).—Winter and spring terms, two hours and three hours respectively. Professor GARDNER.

Partnership (Law 18).—Spring term, three hours. Professor Gardner.

Constitutional Law (Law 19).—Spring term, three hours. Professor Gardner.

Equity Pleading (Law 20).—Spring term, one hour. Professor Pickett.

SEMINARY COURSE IN LEGAL HISTORY

During the fall and winter terms (1898-99) there will be given a seminary course in legal history under the joint direction of Professors Gardner and Pickett of the School of Law, and Professor Greene and Dr. Howland of the department of history. It is proposed to study in detail the Year Books covering a limited period with special reference to land tenures, feudal obligations, and the practice in the courts. This course is for advanced students only, and a reading knowledge of Latin and French is essential.

DEGREES

BACHELOR OF LAWS

The basis for the degree of Bachelor of Law is ninety term-hours of work. A "term-hour" as here used means one hour per day of class-room work for one-third of a year. The degree will be conferred upon the completion of the course above set forth.

Every candidate for the degree of bachelor of laws must present a thesis embodying the results of original research upon a subject approved by the faculty.

MASTER OF LAWS

Work leading to the master's degree will be announced later.

All degrees will be conferred by the University at the usual commencement in June.

ADMISSION TO THE BAR

Under the rules of the Supreme Court of Illinois, all candidates for admission to the bar must have completed a

three years' course of study in a law school or a law office, and must then pass an examination to be given by the state board of bar examiners.

LIBRARY FACILITIES

The University spares no effort to make the library of the School of Law complete in every line essential to the best work of the student. It contains all the leading reference works and text-books, including the chief leading periodicals, the United States Reports, the Reports of Illinois, and of several other states. The collection will be supplemented from time to time.

Besides the law library, students have access to the general libraries of the University, aggregating some forty thousand volumes.

FEES

The fee for matriculation is $10.00, and for diploma is $5.00. The tuition is $50.00 per year, of which $25.00 is payable at the opening of the year, $15.00 at the opening of the winter term, and $10.00 at the opening of the spring term.

THE SCHOOL OF MEDICINE

[For Faculty of the School of Medicine, see p. 14.]

HISTORY

The College of Physicians and Surgeons is located on the corner of Harrison and Honore streets, Chicago, in the very heart of the "Latin Quarter" of the city. It was founded in the year 1882 by a number of representative physicians and surgeons. The College, notwithstanding its excellent educational standing, did not prosper financially during the first ten years of its existence, but in 1892 radical changes in the composition of the Faculty and in methods of instruction and administration were effected, and since that time it has grown with steadiness and rapidity. It was affiliated with the University in April, 1897.

Chicago is already the center of medical study in the United States. In the winter of 1896-97 it contained a larger number of medical students than any other city in the western hemisphere. These students are distributed among fourteen medical colleges, of which the College of Physicians and Surgeons is the second, as to the size of its classes, and is not outranked by any in respect to its facilities, or the scope and thoroughness of its curriculum, or in regard to the place it occupies in the esteem of the medical profession. During the current session there are in attendance 408 students, seventeen of whom are women.

SESSIONS

The collegiate year is divided into two sessions, the winter session, which begins on the third Tuesday in Sep-

tember and ends on the third Tuesday in April; and the spring session, which begins on the third Wednesday in April and ends on the last week-day in June. The winter session is obligatory. The spring session is a supplementary course designed to furnish students opportunities to do special work and to make up arrearages of study.

REQUIREMENTS FOR ADMISSION

First, a certificate of good moral character from two reputable physicians.

Second, a diploma from a recognized college, academy, or high school. Students unable to meet this requirement are accepted upon passing a satisfactory examination in the following subjects:

(a) English: The writing of an essay of at least two hundred words on a selected subject. Goldsmith's Vicar of Wakefield will furnish the basis of examination in English for this year.

(b) Physics: The principles of mechanics and hydraulics, Mechanics' Natural Philosophy, Part I, is recommended in preparation.

(c) Mathematics: The whole of arithmetic; elementary algebra; the metric system of weights and measures. Beginning with the fall of 1899, plane geometry, as given in Wells or Wentworth, will be required.

(d) Latin: The rudiments of Latin grammar and an ability to translate Latin from Cæsar's Commentaries. One year's time will be allowed to make up deficiencies in Latin.

Beginning with the fall of 1899, the minimum entrance requirement will be satisfactory evidence of scholarship equivalent to three years' work in an accredited high school, which must include the subjects mentioned above.

The entrance examination will be conducted in writing by a committee outside the Faculty of the School of Medicine appointed by the President of the University, and will be held at the medical college at 10 a. m. on the Monday preceding the opening of the winter and spring terms.

ADVANCED STANDING

Students who have received the degree of bachelor of arts or bachelor of science, and those who have completed a "medical preparatory course," equivalent to that given by the University of Illinois, and graduates of reputable schools of pharmacy, veterinary science, or dental surgery, may enter the sophomore class and complete their studies upon three years of attendance, provided they fulfill all other requirements for admission and graduation. *Students thus advanced may not complain of any conflict of hours, nor absent themselves from any part of the lower conflicting course*; but they may make up deficiencies in the work of the winter session during the spring course in such branches as are represented in that course.

COURSE OF STUDY

The curriculum required of all students for graduation extends over four years. During the first two years the work is confined to the sciences fundamental to practical medicine. During the freshman year this consists of work in histology, biology, embryology, chemistry, human anatomy, physiology, and materia medica. During the sophomore year the study of physiology, chemistry, and human anatomy is continued, and in addition the student takes up pathology, bacteriology, and therapeutics. With the junior year the study of the practical branches of medicine is begun. The entire subjects of practice of medicine, surgery, and obstetrics are covered in recitation courses. The student also begins clinical and bedside work and receives instruction in medical and surgical specialties. More advanced work along the same lines is continued in the senior year. Practice of medicine, surgery, and obstetrics are gone over again, this time in lecture courses and with greater minuteness of detail and profuseness of illustration. The various special departments of medicine and surgery are presented with like thoroughness and a large part of the student's time is given to the study of individual sick and injured people.

EQUIPMENT

The college building is a six-story structure on the corner of two wide streets, with an open space around it on all sides. It is heated by steam and provided with all modern conveniences. It contains three well-lighted and well-ventilated amphitheaters, the smallest of which seats two hundred students. In these amphitheaters the usual lectures are given. Adjacent to the college building on the west is the laboratory building. The laboratories contained therein are among the largest and most complete possessed by any medical college in the United States. They occupy four floors, three of them 25x100 feet each, and one 25x56 feet. Each will accommodate one hundred and twenty students at a time. They are provided with desks and lockers for students' use, and are well adapted for the work for which they are severally intended. Adjoining the laboratories are preparation rooms for the use of demonstrators and professors. There is a bone room, to which students have free access for the study of osteology. In the department of pathology the collections furnish ample material for the macroscopical as well as the microscopical study of diseased tissues. The store rooms are connected with all the laboratories by means of an elevator. In the instrument room there are thirty-one first-class Leitz microscopes and forty-three Bausch and Lomb microscopes of continental patterns, besides twenty-five microscopes of various other manufacturers, all for the daily use of the students. The college has also sixteen Bausch and Lomb microtomes, besides microtomes of large size and special construction for particular kinds of work.

FREE DISPENSARY

The dispensary occupies the first floor and a portion of the second floor of the main building. Connected with the reception room are fourteen clinic rooms for the accommodation of the various specialties in medicine and surgery. During the past five years there have been treated in these rooms an average of twenty thousand patients each year.

HOSPITAL FACILITIES

Members of the faculty and other friends of the College have recently purchased the adjoining building of the Post-Graduate Medical School and converted it into a hospital of 125 beds. It is a large, handsome structure, 50x100 feet, five stories high, of modern construction, and elegantly furnished. It is connected with the college amphitheater by a corridor and its clinical resources are thus made easily available for the instruction of students.

Directly opposite the College is Cook County Hospital, the only free hospital in Chicago. It contains almost a thousand patients, and supplies a quantity and variety of disease and injury which no private institution can command. In the amphitheater of the hospital much of the clinical instruction of the college is given. In addition to the foregoing resources members of the faculty are connected with various other hospitals of the city and freely draw upon them for the benefit of students

METHOD OF INSTRUCTION

During the first two years the time of the students is about equally divided between laboratory and didactic work. The plan of instruction in the College contemplates the freest use of laboratory teaching. Wherever possible practical laboratory work is made to supplement didactic teaching. Students are taught not only by prepared specimens, but they are required to prepare their own specimens from the original material, and are thus made familiar with technical methods, so that they become able independently to carry a technical investigation through all of its stages. During the junior and senior years the time is about equally divided between clinical and didactic work, with, perhaps, a preponderance of clinical instruction in the senior year. This clinical instruction is carried on, as far as possible, with the student at the patient's side. Attendance upon clinics is required in the same way as upon lectures, and the students are graded upon, and given credit for, their work in the

clinical courses just as they are for their work in the didactic and laboratory courses. During the winter sessions the students of the junior and senior years are divided into classes for dispensary work and these classes have instruction in rotation in the various departments of practical medicine. During the spring term the dispensary clinics are thrown open to students of all classes.

REQUIREMENTS FOR GRADUATION

First, a certificate of good moral character by two reputable physicians.

Second, satisfactory deportment during attendance at college.

Third, satisfactory evidence that the candidate is twenty-one years of age.

Fourth, proof that the candidate has attended at least four full courses of instruction in four separate years, the last of which shall have been in this institution.

Fifth, certificate that the candidate has pursued the study of practical anatomy during two years and to the extent of having dissected at least the lateral half of the human body.

Sixth, certificate that the candidate has attended two full courses of dispensary and hospital clinics.

Seventh, payment of all the college fees in full.

LIBRARY

The College has for several years had a reference library of several hundred volumes. This library owes its foundation to the gift to the College of the collection of books of the late Prof. A. Reeves Jackson. It has been added to largely from time to time by contributions from members of the faculty and other friends of the College. Its usefulness has recently been greatly augmented by gifts from the Dean of the Faculty, in consideration of which, and of provision made for its permanent maintenance and growth, it has been named by the faculty the Quine Library. It

already contains practically every book of reference required by medical students and the important medical periodicals. It is in charge of a trained librarian and is open daily from nine to five for the use of students.

More detailed information concerning the College may be obtained by application to the Registrar of the University, Urbana, Ill., or to the Secretary of the School of Medicine, 103 State Street, Chicago.

THE SCHOOL OF PHARMACY

[For Faculty of School of Pharmacy, see p. 18.]

HISTORY

The Chicago College of Pharmacy is a corporation which was founded by prominent pharmacists of Chicago and vicinity in 1859 for the purpose of advancing the practice of pharmacy. One of the first steps taken was the establishment of a school of pharmacy. At that time there was no school of the kind west of the Alleghany Mountains. Members and friends contributed money, books, apparatus, and supplies; teachers were secured and a course of lectures was instituted in November, 1859.

The first class, of but two students, was graduated in 1861. The war caused a suspension of the teaching, and the school was not reopened until 1870. The great fire, in 1871, destroyed the equipment, but pharmacists throughout Europe and America extended help to the institution, furnishing an excellent library and outfit of apparatus, which became the nucleus of the present complete equipment. In 1872 the instruction was resumed for the second time and has since continued without interruption.

"The Pharmacist," a monthly journal published by the College, from 1866 until 1886, did much to advance the interests of pharmacy in the West.

In 1880 the members and graduates of the College took an active part in the formation of the Illinois Pharmaceutical Association, which, in the following year, secured the passage of the pharmacy law.

The twenty-fifth anniversary of the founding of the College was signalized by the completion and occupation of a

building in which ample space for many years' growth was provided. The better accommodations gave an impulse to better work. Up to this time instruction had been given mainly by means of lectures, laboratory work being entirely optional. Laboratory courses in pharmacy, chemistry, and vegetable histology were now made obligatory. A laboratory devoted entirely to prescription compounding was established in 1892. The excellence of the equipment in this department won for the College a medal and diploma at the World's Columbian Exposition.

The College was formally united with the University May 1, 1896, and is now conducted as the technical "School of Pharmacy of the University of Illinois." In the management of the School the Trustees and officers of the University have the assistance of an advisory board of pharmacists elected by the registered pharmacists of the state through the Illinois Pharmaceutical Association.

The school is situated near the business center of Chicago. In addition to the larger amphitheater, known as "Attfield Hall," which has a seating capacity of three hundred and fifty, the building occupied has a smaller hall especially fitted for lectures and demonstrations in chemistry and capable of seating one hundred and fifty persons. The chemical and pharmaceutical laboratories, as well as the microscopical laboratory and the dispensing laboratory, are commodious and well appointed.

The courses of instruction, covering two terms of twenty-six weeks each, extending from October 4th to April 21st, afford opportunities for a thorough technical training such as is necessary for the successful practice of pharmacy. The subjects taught are pharmacy, chemistry, botany, and materia medica.

The system of teaching includes lectures, demonstrations, recitations, written and oral examinations, as well as individual instruction in actual work in operative and dispensing pharmacy, analytical chemistry, use of the compound microscope, etc. Much time is devoted to laboratory practice.

REQUIREMENTS FOR ADMISSION

Applicants for admission must be at least sixteen years of age and must furnish evidence of their ability to prosecute the work of the course successfully.

The preliminary education should be equivalent to that required for entrance to a good high school.

Students who have pursued courses of study in other colleges of pharmacy will be given credit for such portions of their work as are equivalent to the work required by this college.

REQUIREMENTS FOR GRADUATION

The candidate for the degree of graduate in pharmacy must be twenty-one years of age, must have had four years' practical experience in pharmacy, including the period of attendance at college, and must have attended two full courses of instruction, the first of which may have been in some other reputable college or school of pharmacy. He must have attended regularly the laboratory and lecture courses of this College, must pass the examinations, and must not have been absent more than five times during the term from either laboratory exercises or lectures in any department.

Candidates may present themselves for examination during the last year of their required experience or of their attainment of legal majority.

To students who complete a third year's work, embracing principally instruction in more advanced pharmaceutical chemistry and in bacteriology, the degree of pharmaceutical chemist is offered. Drug-store experience will not be required for this degree.

Persons competent to fulfill the general requirements of admission to the University may be granted credit upon the University courses for equivalent work satisfactorily completed at the School of Pharmacy.

Further information is given in the special announcement of this school. Address W. B. Day, Actuary, School of Pharmacy, 465-7 State Street, Chicago, Ill.

GENERAL DESCRIPTION OF COURSES

Following the description of each course of instruction will be found the necessary requirements, if any, for admission to that particular course. Careful attention must be given to these requirements and to the sequence of studies thus indicated. For instance, under Architecture 4, for students of the College of Engineering, page 161, there are required "Mathematics 4," "Physics 1 and 3," and "Architecture 2 and 3." Turning now to these subjects, it is found that mathematics 4 is trigonometry, physics 1 and 3 are the major course of one year, architecture 2 is wood construction, and architecture 3 is stone, brick, and metal construction. All these subjects must be satisfactorily passed before admission may be had to the class in astronomy.

In case a course not required for graduation is selected by less than five students, the right to withdraw the same for the term is reserved.

Graduate courses of instruction are described under the various subjects, as a rule after the undergraduate courses. They are numbered upward from 100. Other courses may often be arranged by the professors in charge to meet the special requirements of students. The subjects in which graduate courses are announced for 1898-99 are as follows:

Agriculture, architecture, botany, chemistry, civil engineering, Danish language, economics, electrical engineering, French, geology, Greek, history, Latin, mechanical engineering, municipal and sanitary engineering, pedagogy, philosophy, psychology, theoretical and applied mechanics, zoölogy.

AGRICULTURE

1. Crop Production.—A course of study directed to the principles underlying successful practice in the economic production of crops on fertile lands.

a. The agricultural crops of the United States and their growth elsewhere; varieties and seed; conditions of germination and of

growth, and their influence upon development. *Spring term, at 9, full credit.* Assistant Professor HOLDEN.

b. Origin and classes of soils; conditions and indications of fertility; comparison of successful methods with a view to securing the most favorable conditions of growth on fertile lands by means of cultivation, drainage, irrigation, or other process aside from the use of fertilizers—the manipulation of fertile soils. *Fall term, at 9, full credit.* Assistant Professor HOLDEN.

2. LIVE STOCK.—a. Origin of the breeds of domestic animals and their distinguishing characters; adaptation of breeds for particular purposes and their value for grading, accompanied by critical study and practice in the art of judging both as to breed type and as to constitution and individual merit. Practice on Saturdays. *Fall term, at 11, three-fifths credit.* Professor DAVENPORT.

b. A brief study of the care and management of the live stock of the farm as to housing and feed, particularly directed to the economic sources of feeding stuffs, their equivalency and suitable preparation. *Spring term, at 11, two-fifths credit.* Professor DAVENPORT.

3. STOCK BREEDING.—Variation, its extent and importance, both in nature and under domestication; how far inherent and how far induced by environment. Correlated variation. Selection. Survival of the fittest. Effects of use and disuse. Intercrossing. Hybridism. Grading. Breeding in line and inbreeding. Instinct and intelligence. Acquired characters and their inheritance. The aim is to bring every known principle of reproduction to the assistance of the breeder's art, and to study the methods of successful breeders and their results. *Fall term, at 10, full credit.* Professor DAVENPORT.

Required: Botany 1; Zoölogy 3; Physiology 1.

4. FERTILITY.—Influence of fertilizers on the amount, character, and composition of crops. Effects of particular crops upon fertility and upon each other, when grown in succession or together. Nitrogen and leguminous crops. Conservation of fertility by the rotation of crops. Economic sources of the elements of fertility; fertilizers and manures, their valuation and use under both extensive and intensive methods. *Spring term, at 10, full credit.* Assistant Professor HOLDEN.

Required: Botany 1; Chemistry 1, 3a, 4.

5. STOCK FEEDING.—Functional activities of the animal body and the end products of their metabolism. Foods are considered,

first chemically, as affording the materials for these activities, whether in construction of body tissues or of animal products, as meat, milk, etc.; second dynamically, as supplying the potential energy for these processes, and for labor, speed, etc. A study of the development of the animal after birth and of the phenomena of animal nutrition from the economic standpoint, in which animal activity is considered as an agent for transformation of energy and the resultant product as a source of profit. *Spring term, at 10, full credit.* Professor DAVENPORT.

Required: Botany 2; Physics 2; Physiology 1; Zoölogy 3.

6. SOILS.—A critical study of the processes, chemical, physical, and biological, that are active within the soil; influence of fertilizer and of crop upon the soil; natural sources of fertility, as rain water, leguminous herbage; residues or the fate of fertility, whether natural or applied, as shown by a study of drainage waters; agency of bacteria and the conditions of their activity, and the cumulative effect of manures and of various agricultural practices. The whole is designed to develop the need for, and to fix the character of, such rotations and practices as shall tend to conserve fertility and to insure perpetual productiveness or soils. Lectures and reference readings. *Fall term, at 10, full credit.* Assistant Professor HOLDEN.

Required: Botany 1; Chemistry 1, 3a, 4; Zoölogy 3, or Botany 2.

7. COMPARATIVE AGRICULTURE.—Influence of locality, climate, soil, race, customs, laws, religion, etc., upon the agriculture of a country and incidentally upon its people. One crop only and its effect, as rice; Indian corn in American agriculture and affairs. Varying conditions under which the same crop may be produced, as wheat. Statistical agriculture. Influence of machinery and of land titles, whether resting in the government, in landlord, or in occupant. Relation of agriculture to other industries and to the body politic. *Spring term, at 9, full credit.* Professor DAVENPORT.

Required: Two years of University work.

8. AGRICULTURAL EXPERIMENTATION.—A systematic study of the work of experiment stations and experimenters in this and other countries, together with a critical study of correct principles and methods of experimentation, especially designed for such students as desire to fit themselves for work in original investigation in experiment stations or elsewhere. *Winter term, at 11.05, full credit.* Professor DAVENPORT.

Required: Agriculture 2, 4, 6.

9. DAIRYING.—Secretion of milk; its composition as determined by chemical analysis and by microscopic examination. General facts concerning bacteria in their special relation to milk, butter, and cheese. Methods of preventing contamination. Development of acid and the acid test. Pasteurization. Different methods of testing for fat contents, total solids, and adulterations. Variations in milk and their causes. Economic production of milk. Use and care of cream separators. Comparison of different systems of creaming and the making of butter by the most approved methods. *Winter term, at 8.20, full credit.* Mr. FRASER.

10. INVESTIGATION AND THESIS.—There are required for graduation two terms of original investigation, the results and methods of which are to be embodied in the form of an acceptable thesis. The student may choose his subject along the line of any of the required studies of the course. The selection should be made before the opening term of the last year.

11. BUTTER MAKING.—Operation of, and studies in efficiency of, different separators in comparison with gravity methods of creaming under a variety of conditions. Influence of character of milk and its handling upon the quality of butter. Different methods of ripening cream and the effect upon churning and upon butter, together with extended practice in the manufacture and in scoring of butter. *Spring term, at 8, full credit.* Mr. FRASER.

Required: Agriculure 9.

COURSES FOR GRADUATES

101. BREEDING.—Variation and heredity, their nature and phenomena as influenced by selection, environment, and use, with special reference to improvement of domestic animals.

102. PHYSIOLOGICAL CHEMISTRY AND THE NATURE OF FOOD.—A study of the functional activities of the animal body and the end products of their metabolism, as a basis for economical feeding.

103. COMPARATIVE AGRICULTURE.—The principles and practices of agriculture as influenced by soil, climate, tradition or the political, social, or religious condition of men.

ANTHROPOLOGY

1. This course, in general anthropology, begins with a study of the physical and psychical elements of ethnography. Theories as to the origin of man are discussed, and the various races of mankind are distinguished and described. Special attention is given to the

historical and comparative study of customs, ceremonies, and rights, beliefs, and folklore of primitive peoples, with reference to the common characteristics and fundamental instincts of mankind and to the origin and growth of existing customs and social institutions. *Winter term, at 8.20, full credit.* Assistant Professor DANIELS.

Required: A major or minor course in Economics, Geology, Psychology, or Zoölogy.

ARCHITECTURE

2. WOOD CONSTRUCTION.—Formulæ and data for computing dimensions and strength of columns, beams, girders, etc., of wood or metal, are given and applied in the solution of examples. Wood and its uses in construction and decoration, seasoning, shrinkage, defects, and modes of protection from decay. Construction and design of wooden floors, walls, ceilings, and roofs, and joinery, doors, windows, bays, inside finish, cornices, wainscoting, stairs, etc. *Ricker's Wood, Stone, Brick, and Metal Construction; Jones's Logarithmic Tables. Fall term, at 2.20, full credit.* Assistant Professor MCLANE.

Required: General Engineering Drawing 1, 2, 3, 4.

3. STONE, BRICK, AND METAL CONSTRUCTION.—Foundations of stone, brick, concrete, and piles, materials employed in stone masonry, their uses, defects, qualities, and modes of preparation. Kinds of masonry and external finish. Tools for stone cutting and their use. Preparation of working drawings, with application to the arch, vault, and dome. Brick masonry, its materials and bonds. Manufacture and refining of cast iron, wrought iron, and steel, with processes of pattern-making, molding, casting, refining, rolling, etc., and standard dimensions or sections. Special properties and value of metal in a structure, designing a line of columns in mercantile building, and of beams, girders, and footings, together with the study of joints and connections. Same text-books as in fall term. *Winter term, at 2.10, full credit.* Assistant Professor MCLANE.

Required: General Engineering Drawing 1, 2, 3, 4.

4. SANITARY CONSTRUCTION.—Daily recitations or lectures, designs for special problems. Study of plumbing, trap ventilation, removal of wastes, construction of water closets, drains, and systems of water supply; sewage disposal. Water supply and fixtures in dwellings. *Gerhard's Drainage and Sewerage of Dwellings;*

Lectures on Sewage Disposal. Spring term, at 3.20, full credit. Assistant Professor McLane.

Required: Math. 4; Physics 1, 3; Arch. 2, 3.

5. Roofs.—Elements of graphic statics and applications in designing trussed roofs. Forces, equilibrium, reactions, moments, bending moments, and shears on beams, center of gravity and moment of inertia of cross sections. Construction of wooden and of metallic roofs, mode of computing loads on roof trusses, obtaining end reactions, drawing strain diagrams, and determining sectional dimensions of members, with the designing of joint connections. *Ricker's Trussed Roofs. Ricker's Notes on Graphic Statics. Spring term, at 8 and at 9, full credit.* Assistant Professor McLane.

Required: Math. 2, 4, 6; Theoretical and Applied Mechanics 1 and 2 or 4 and 5; Architecture 4 (except for students in civil and municipal engineering).

6. History of Architecture.—Two terms' work, divided at beginning of Romanesque style. Commencing with Egyptian and ending with modern styles, a careful study is made of more important styles, examining historical conditions, local and inherited influences, structural materials and system, special ornaments, purposes and designs of the buildings, with the most important typical examples of each style. Especial attention given to ideas useful or suggestive in American work, and to tracing gradual evolution of architectural forms. Two recitations and two illustrated lectures per week. References made to Fergusson, Lubke, Durm, Reber, Gailhabaud, etc. *Ricker's Notes on History of Architecture, Fletcher's History of Architecture. Fall term, M., W., Th., F., at 10; winter term, M., W., Th., F., at 1.15, four-fifths credit.* Professor Ricker.

Required: Architecture 4, 8, 9.

7. History of Architecture (Details).—Exercises in drawing at large scale the most important details of the Grecian, Roman, Early Christian, Byzantine, Mohammedan, Romanesque, Gothic, and Renaissance styles. *Notes and Sketches. Spring term, M., W., Th., F., at 1.20, four-fifths credit.* Associate Professor White.

Required: Architecture 6, 20.

8. Architectural Drawing.—The term is devoted to the Five Orders of Architecture, and to architectural Shades and Shadows. A careful study of the proportions and details of the Orders is first made with lectures, recitations, and blackboard sketches from memory. *Ware's Five Orders; Lectures on Shades and Shadows. Spring term, at 8, full credit.* Assistant Professor Temple.

Required: Gen. Eng'g Drawing 1, 2, 4; Arch. 20.

9. ARCHITECTURAL DRAWING—(Monthly Problems).—Preliminary instruction in rendering.—An entire day in each month during the sophomore and junior years is devoted to a problem in design, requiring the use of the Orders. Program is made known at beginning of the exercise, and sketches must be completed and rendered during the same day. Credit is given for this study only after the completion of each year. *Once a month, fall, winter, and spring terms, two years, full credit.* Assistant Professor TEMPLE.

Required: General Engineering Drawing 1, 2, 3, 4; Architecture 8.

10. ARCHITECTURAL DRAWING—(Office Work).—Instruction in this study will be given in connection with Architectural Designing (Arch. 16).

11. ARCHITECTURAL SEMINARY.—For juniors, reports and discussions of original investigations of assigned topics in History of Architecture; reviews of books, abstracts of current technical journals, and other publications. *Fall term, Tu., at 10; winter and spring terms, Tu., at 1.20, one-fifth credit.* Taken with Arch. 6 and 7. Professor RICKER.

12. SUPERINTENDENCE, ESTIMATES, AND SPECIFICATIONS.—This study comprises several specialties in office work, not otherwise provided for, so far as they can be taught in a professional school.

Clarke's Building Superintendence is carefully read with daily recitations; *Lectures on Building Law; Bower's Specifications.*

Usual methods of measurements of material and work, arrangement of computations in proper and convenient order, and an acquaintance with approximate prices of materials and labor, which vary in different localities. The methods of squaring, of cubing, of units, and of quantities, are each employed and illustrated by numerous examples.

In specifications, practice is obtained by writing out complete sets for buildings.

Dietzgen's Specification Blanks are employed. The standard *Contract of the American Institute of Architects* is used, being first carefully studied, then filled out for buildings. Bids, certificates, and other papers are made out. *Ricker's Lectures on Estimates. Winter term, at 1.15, full credit.* Associate Professor WHITE.

Required: Architecture 5, 6, 11; Theoretical and Applied Mechanics 1, 2, or 4, 5.

13. HEATING AND VENTILATION.—Scientific theory and practice of warming and ventilating buildings is the object of this study. Commencing with fuels and production of heat, then passing to flow of gases through ajutages and pipes, applying these data to calculation of dimensions of air ducts and chimneys. Different systems of heating by furnaces, hot water, steam, etc., are next examined, with details of each. Sources of impurity in the air and requirements of good ventilation are then considered, with the different methods of ventilation by aspiration, by fans, etc., ending with the study of fans of different types. Numerous problems are given and heating plants designed. *Carpenter's Heating and Ventilating Buildings; Ricker's Notes on Heating and Ventilation. Fall term, at 10, full credit.* Associate Professor WHITE.

Required: Mathematics 2, 4, 6; Architecture 2, 3, 4, 9, 15; Physics 1, 3; Chemistry 1; Theoretical and Applied Mechanics 1, 2, or 4, 5.

14. ARCHITECTURAL PERSPECTIVE.—Theory of perspective is taught with labor saving methods of abbreviating work, and designing in perspective itself is made a special aim, being very useful to a draftsman in preparing sketches for clients. Problems in angular, parallel, vertical, and curvilinear perspective, as well as in perspective shades and shadows, are solved, requiring original work as far as possible, so as thoroughly to prepare the student for any kind of work in perspective, instead of restricting him to the study and use of a single system. *Ware's Modern Perspective. Winter term, at 8.20, full credit.* Assistant Professor TEMPLE.

Required: General Engineering Drawing 1, 2, 3, 4; Architecture 16, 17.

15. REQUIREMENTS AND PLANNING OF BUILDINGS.—Lectures are fully illustrated by plans sketched on the blackboard, which must be embodied in students' notes. Numerous problems in planning are given. References are made to the University library and the architectural cabinet. Lectures. *Winter term, at 10.10, full credit.* Associate Professor WHITE.

Required: Architecture 4, 8, 9, 17.

16. ARCHITECTURAL DESIGNING—(Residences).—Practice in office methods of preparing drawings and in design and study of the requirements for dwellings. The work is limited to residences, since this class of buildings is likely to afford the graduate his first opportunity for independent original work. *Osborne's Notes on Home Planning.* Lectures with blackboard sketches to be copied

in students' notes. Problems in design worked out in rendered drawings. *Fall term, at 10, full credit.* Associate Professor WHITE.

Required: Architecture 4, 8, 9, 17, 20.

17. ARCHITECTURAL DESIGNING — (Problems). — Elementary architectural forms are first traced and sketched from memory; simple problems in design are then solved by sketch plans, elevations and sections, rendered in shade or color as required. The object is to obtain as much practice in original design as possible, and to form a collection of suggestive tracings and sketches. *Fall term, at 8, full credit.* Assistant Professor TEMPLE.

Required: Architecture 4, 7, 8, 9, 18, 20.

18. ARCHITECTURAL COMPOSITION.—A careful study is made of the laws of architectural design and of the results of experience embodied in the text-book, with numerous references to other authors. Commences with general principles, passing to an examination of proportions employed in most important styles, arrangement of plan, external design in general and detail, ceilings and interiors, arrangement of corridors, stairways, and entrances, of internal courts, and of halls for large assemblages. Frequent problems in design afford practical applications of the principles. *Ricker's Translation of Architektonische Composition* (Handbuch der Architektur). *Spring term, at 10, full credit.* Professor RICKER.

Required: Architecture 6, 7, 14, 17, 20.

19. ARCHITECTURAL ENGINEERING.—This continues the study of graphic statics, commenced in "roofs," with applications to metallic roofs of wide span, roof trusses of curved or unusual form, and those supported by abutments and jointed. Spherical and conical trussed domes. Effect of moving loads on girders, the graphical analysis of the arch, vault, and dome, and of the Gothic system of vault and buttress. Construction and details of steel skeleton buildings. Practical applications are made to a series of problems in design for specified cases. *Ricker's Notes on Advanced Graphics; Freitag's Architectural Engineering; Ricker's Translation of Wittman's Arch and Vault.* References to the works of Planat, Landsberg, DuBois, Clarke, Ott, Levy, Muller-Breslau, etc.; on Graphic Statics. *Spring term, at 3.20, full credit.* Associate Professor WHITE.

Required: Math. 2, 4, 6; Theoretical and Applied Mechanics 1 and 2, or 4 and 5; Architecture 4, 5.

20. ARCHITECTS' ART COURSE 1. Prescribed.

Any three of Art and Design 1, 2, 3, 5, 6, 13. *Fall, winter, and spring terms.* Professor FREDERICK.

21. Architects' Art Course 2. Optional.

Any three of art and design 5, 6, 7, 8, 11, 13. *Fall, winter, and spring terms.* Professor Frederick.

Required: Architecture 20.

The art and design courses offered as architecture 20 and 21 are varied to meet the special needs of students of architecture.

22. Renaissance Design.—*Fall term, at 1.20, full credit.* Assistant Professor Temple.

23. Gothic Design.—*Lecture, M., W., at 9.15; drawing, Tu., Th., F., at 8.20. Winter term, full credit.*

24. Romanesque Design.—*Lecture, Tu., Th., at 10.10; drawing, M., W., F., at 10.10. Winter term, full credit.*

In each of these three courses a prescribed series of tracings of important details is made, and problems in design are worked out as fully as time permits. A course of lectures will be given during each term. These will be fully illustrated by stereopticon views and blackboard drawings. A second term of work in architecture 22 will be accepted in lieu of architecture 23 or 24. Professor Ricker, Associate Professor White, and Assistant Professor Temple.

Required: Architecture 11, 15, 18, 20.

25. Composition of Ornament.—This term is devoted to the study of historical ornament and to daily exercises in designing architectural ornament to decorate the structural forms usually found in practice. These designs will be charcoal or crayon sketches, drawings rendered in shade or color, or finished drawings. They will be made on as large a scale as possible, usually full size. Lectures. *Meyer's Hand-book of Ornament. Spring term, at 1.20, full credit.* Assistant Professor Temple.

Required: Architecture 5, 7, 11, 15, 16, 18, 20, 22, 23, 24.

26. Vacation Sketches.—At the beginning of the junior and senior years, each student should present a suitable number of vacation sketches for approval by Assistant Professor Temple.

COURSES FOR GRADUATES

Primary

101. Construction of Extensive Wooden Buildings, 1, 2, or 3 credits.

102. Recent Uses of Stone, Brick, and Terra Cotta in Architecture, 1 credit.

103. Metallic Skeleton Buildings, 1, 2, or 3 credits.

104. Fire-resisting and Fire-proof Buildings, 1 credit.

105. Sanitation of Public and Semi-public Buildings, 1, 2, or 3 credits.

106. Researches on the Evolution of Architectural Styles, 1 credit.

107. Higher Application of Graphic Statics, 1, 2, or 3 credits.

108. Heating and Ventilation of Large Buildings, 1, 2, or 3 credits.

109. Higher Studies in Architectural Design, 1, 2, or 3 credits.

110. Researches and Experiments in Applied Esthetics, 1 credit.

111. Translation of an Approved Technical Architectural Work from the French or German, 1, 2, or 3 credits.

112. Indexing and Classification of Periodicals, Books, Data, and Technical Information for Architects and Engineers.

Secondary

113. Stereotomy Applied to American Problems, 1 credit.

114. Examinations of Heating and Ventilation of Buildings, 1, 2, or 3 credits.

115. Photography for Architects, 1 credit.

116. Methods of Reproducing Drawings, Specifications, etc., for Architects, 1 credit.

117. Higher Problems and Methods in Perspective, 1 or 2 credits.

118. Practice in Estimates, Specifications, etc., for Large Buildings, 1, 2, or 3 credits.

119. Higher Industrial Design, 1 or 2 credits.

120. Advanced Water-color Painting, 1 credit.

121. Study of Office Methods and Arrangements, 1 credit.

122. Any *primary* offered in the College of Engineering, 1 credit.

ART AND DESIGN

1. FREE-HAND DRAWING.—Lectures on free-hand perspective and practice in drawing geometric solids. Principles applied by drawing groups of common objects, as books, vases, chairs, etc., casts of ornament; details of the human figure; interiors, as the corner of the room; plants and flowers from nature. *Frederick's Notes on Free-hand Drawing. Fall term, at 8, at 10, and at 1.20; winter and spring terms, at 8, and at 1.20, full credit.* Mr. LAKE.

2. CHIAROSCURO.—Study of chiaroscuro in charcoal, crayon, ink, pencil, and water color (monochrome) of geometric solids,

still-life, casts of ornament, details of the human face and animal forms. *Winter and spring terms, at 8.10, at 10, and at 1.20, full credit.* Professor FREDERICK and Mr. LAKE.

Required: Art and Design 1.

3. ARTISTIC ANATOMY.—Artistic anatomy of the human figure. Drawing from Rimmer's Art Anatomy and Julien's Études d'Après l'Antique. Outline drawing from the antique figure. Study of action. *Duval's Artistic Anatomy. Spring term, at 8, at 10, and at 1.20, full credit.* Mr. LAKE.

Required: Art and Design 1, 2.

4. THE ANTIQUE.—Shaded drawings in charcoal or oil from the antique figure. Sketching from costumed model. *Spring term, at 10 and at 1.20, full credit.* Professor FREDERICK.

Required: Art and Design 1, 2, 3.

5. PEN DRAWING.—Work with pen and ink arranged to suit the needs of students from all departments. *Fall term, at 8, at 10, and at 1.20, full credit.* Professor FREDERICK and Mr. LAKE.

Required: Art and Design 1.

6. MODELING.—Modeling in clay (*a*) details of human face, (*b*) copy of cast of ornament, (*c*) ornament from photograph. Casts are made of (*a*) at least one modeled piece, (*b*) arm, hand, or foot from nature, *(c)* foliage, fruit, or vegetable from nature (*Frederick's Plaster Casts and How They are Made). Fall term, at 10 and at 1.20, full credit.* Professor FREDERICK.

Required: Art and Design 1, 2.

7. ADVANCED MODELING.—Modeling: *(a)* bas-relief from antique figure, (*b*) anatomical rendering of an antique figure, (*c*) bust from the antique, *(d)* portrait head from nature in the round or relief, *(e)* antique figure in the round, *(f)* original design. Casting: *(a)* piece mold, *(b)* sulphur mold, *(c)* gelatine mold. *Fall term, at 10, and at 1.20, full credit.* Professor FREDERICK.

Required: Art and Design 1, 2, 6.

8. OIL PAINTING.—This course of painting in oil color is designed for beginners, and consists of two parts: *(a)* study in monochrome from still-life; *(b)* group, as a study for composition and color. *Winter term, at 10.10, and at 1.15, full credit.* Professor FREDERICK.

Required: Art and Design 1, 2, 3.

9. ADVANCED OIL PAINTING.—This is a continuation of course 8. It comprises a careful study of the methods followed in landscape painting. A number of time sketches of still-life are required.

Winter term, at 10.10 and at 1.15, full credit. Professor FREDERICK.

Required: Art and Design 1, 2, 3, 8.

10. WATER-COLOR PAINTING.—Painting in water-color: (*a*) group, as a study for composition and color; (*b*) sketching from nature; (*c*) flowers from copy and from nature. *Spring term, at 10 and at 1.20, full credit.* Professor FREDERICK.

Required: Art and Design 1, 2.

11. THEORY OF COLOR.—In this course the student takes up the study of color as a means of interior and exterior decoration. Several original problems are required. *Winter term, at 10.10 and at 1.15, full credit.* Professor FREDERICK.

Required: Art and Design 1, 2.

12. RELATION OF DESIGN TO MANUFACTURE.—This is primarily a course in industrial design arranged for special students of that subject. *Spring term, at 1.20, full credit.* Professor FREDERICK.

Required: Art and Design 1, 2, 3, 10, 11.

13. ARCHITECTURAL SKETCHING.—This course is intended primarily for students of architecture. Perspectives are rendered in water-colors and buildings sketched from nature. *Frederick's Architectural Rendering in Sepia. Spring term, at 10, and at 1.20, full credit.* Professor FREDERICK.

Required: Art and Design 1, 2.

ASTRONOMY

4a. DESCRIPTIVE AND GENERAL ASTRONOMY.—Minor course.

The course aims to supply a general knowledgs of the facts of astronomy, a clear conception of underlying principles and some acquaintance with the methods of arriving at these facts. Studies in the location of constellations and stars are made. In this course, practical questions are considered, though not made matters of chief importance, the literary and purely scientific features of the science being assigned chief prominence. *Young's Elements of Astronomy,* also *Young's General Astronomy. Spring term, at 11 and at 1.20, full credit.* Professor MYERS and Mr. BRENKE.

A line of study, consisting of the three following courses, is offered for students who desire to pursue the study of astronomy as a major subject.

4b. DESCRIPTIVE AND GENERAL ASTRONOMY.—This course is arranged for students who wish to gain a general knowledge of

astronomy, and for those who wish to fit themselves either for instruction in high schools, academies, and colleges, or for a professional vocation. It presupposes Math. 4, and is in some respects, a continuation of course 4a. The course is also well suited to the needs of students of the college of science who contemplate special work in the geological and biological sciences. As much time as the degree of attainment of the student will warrant is given to work in the Observatory. *Young's General Astronomy. Fall term, at 11, full credit.* Professor Myers and Mr. Brenke.

Required: Math. 4.

5. Cosmogony.—The chief aim of this course is to acquaint the student with the evidence both for and against the Nebular Theory. The rôle of the tides in cosmogonic development receives special consideration, and the present view, together with the testimony furnished by astronomy relating to the origin and cosmic history of the earth-moon system is recapitulated in detail to the epoch where astronomy yields to geology. A summary of the researches of Darwin and of Lord Kelvin is included. *Clerke's System of the Stars. Winter term, at 1.15, full credit.* Professor Myers and Mr. Brenke.

Required: Entrance credit in astronomy.

6. Practical Astronomy.—This course, which is offered both for engineers and special astronomical students, is intended to give the student training in the use of instruments of precision. As a subordinate matter, he is introduced to instruments of a higher grade than those employed in ordinary surveying. A second purpose of the course is to train the student in the art of computing. Model forms of record and reduction for problems are set before him, and the advantage of compact and orderly arrangement of all work is strenuously insisted upon. As a concrete outcome of the above training, the student should acquire the ability to determine latitude, time, and azimuth with such instruments as are used in the ordinary practice of civil engineering. An essential part of the work is the theory of astronomical instruments. *Campbell's Practical Astronomy. Spring term, at 8, full credit.* Professor Myers and Mr. Brenke.

Required: Astronomy 4a or 4b.

7. Theory of Orbits.—This course embraces the following subjects: The formation and integration of the differential equations of motion of a system of bodies and the derivation of the laws of undisturbed elliptic, parabolic, and hyperbolic motion. The ac-

tual computation of a cometary or planetary orbit is usually made. *Watson's Theoretical Astronomy. Fall term, at 2.20, three-fifths credit.* Professor MYERS.

Required: Math. 1, 3, 9, 10; Astronomy 4a or 4b, 6.

8. SPECIAL PERTURBATIONS.—An investigation of the various formulæ and methods for finding the special perturbations of a heavenly body constitutes the chief subject of this course. The methods of Encke, Hansen, and of Variation of Parameters, are developed and studied at length. As a necessary and preliminary adjunct to the course, an explanation and development of the formulæ needed to integrate by the methods of mechanical quadrature is given.

Watson's Theoretical Astronomy. Winter term, at 2.10, three-fifths credit. Professor MYERS.

Required: Astronomy 7; Math. 14, 16.

9. CELESTIAL MECHANICS.—The laws of motion of a system of bodies are here developed, the usual differential equations being treated. The two and three body problems with allied subjects, are first considered, after which follows a study of absolute perturbations by the method of variation of the canonic elements and other subjects of study such as are treated in *Tisserand's Mechanique Celeste. Spring term, at 2.20, three-fifths credit.* Professor MYERS.

Required: Astronomy 8.

11. CALCULUS OF VARIATIONS.—See Mathematics 20.

12. SPHERICAL HARMONICS.—See Mathematics 21.

13. POTENTIAL FUNCTION.—See Mathematics 22.

10. ASTRONOMICAL SEMINARY AND THESIS.—The work of this seminary is on subjects either related to those considered in the senior courses, or connected with questions arising out of thesis investigations. This course is given in conjunction with astronomy 7, 8, and 9, or with mathematics 11, 12, and 13, according as the one or the other is current. *Fall, winter, and spring terms, Tu. and Th., at 2.20, two-fifths credit.* Professor MYERS.

BOTANY

1. MORPHOLOGY, HISTOLOGY, AND PHYSIOLOGY.—This course extends through the year, but the first term's work is accepted as a minor course for those not making botany a specialty; the second and third terms together can be similarly credited. Laboratory and field work is supplemented and extended by lectures, the study of text, and by reference reading.

(a) The morphology and classification of illustrative groups of plants, beginning with the lowest orders, constitute the work of the first term. Special attention is given to fresh water algæ and to fungi, but mosses, ferns, and flowering plants are included.

(b) During the second and third terms the general histology of plants is studied alternately with experiments in vegetable physiology. Students examine microscopical sections, make microchemical tests, draw figures, and write descriptive notes. In the physiological laboratory the studies include: the extent and causes of movements of fluids in the tissues; the absorption of nutriment materials; respiration; photosynthesis; growth; sensitiveness; variation and heredity, etc. *Fall, winter, and spring terms, at 1.20, full credit.* Professor BURRILL and Mr. HOTTES.

Required: Botany 6, or equivalent; Chemistry 1, and Art and Design 1, 2, must be taken with this course, if not had previously.

2. BACTERIOLOGY.—This course is an introduction to existing knowledge upon the subject, and offers instruction in the modern methods of experimentation and research. Only those who can give extra time, when occasion demands, should undertake the work. Lectures and assigned reading accompany the laboratory work. *Fall term, at 8, full credit.* Professor BURRILL and Mr. HOTTES.

Required: Botany 1 or 6, or Zoölogy 1 or 10; Chemistry 1.

3. SYSTEMATIC BOTANY.—There is offered in this course an opportunity for advanced work upon selected groups of plants, including the collection and preservation of specimens, the identification and description of species, and studies upon systematic affinities.

The morphology and affinities of selected orders of flowering plants, herbaria and herbarium methods, studies upon the evolution of the vegetable world, are included in the work of the first term. The second term is devoted to cryptogamic plants, and the time is largely occupied in the determination and classification of species, together with studies upon life histories. Students who purpose taking this term's work should arrange with the instructor at the beginning of the year or earlier, and should make collections for themselves. Mostly laboratory work. *Fall and winter terms, at 10, full credit.* Professor BURRILL.

Required: Botany 1.

4. REPRODUCTION AND DEVELOPMENT.—Special experimental and research work in vegetable physiology, embryology, and life

histories. Mostly laboratory work. *Spring term, at 10, full credit.* Professor BURRILL and Mr. HOTTES.

Required: Botany 1.

5. INVESTIGATION AND THESIS.—Facilities are offered for original investigations upon selected subjects which may serve as a basis for the thesis required for a degree. Special arrangement should be made with the instructor during the preceding year, or at least not later than the beginning of the year in which the work is to be taken. *Fall, winter, and spring terms, at 1.20, full credit.* Professor BURRILL.

Required: Botany 1, 3, and 4, or an equivalent.

6. MINOR COURSE.—Lectures or recitations and laboratory work. This course is intended to serve as a preparation for courses in botany 1, 2, and 8; also to offer students who do not intend to pursue the subject more than one term, a chance to gain a general knowledge of the vegetable world, including the structure, physiological activities, kinds, and classification of plants, and to acquaint themselves with the methods of study and of instruction followed. *Spring term, at 8 and at 10, full credit.* Professor BURRILL and Mr. HOTTES.

8. ECONOMIC BOTANY.—A study of useful and harmful plants, especially those affecting agricultural and horticultural interests and of prominence in the arts. *Winter term, at 10.10, full credit.* Professor BURRILL.

Required: Botany 6, or an equivalent.

COURSES FOR GRADUATES

101. BIOLOGICAL BOTANY.—The preparation and study of material by histological methods, and experiment work with living vegetation in the laboratory and field in working out special problems in the development, physiology, and pathology of plants.

102. SYSTEMATIC BOTANY.—Critical and comparative studies of species included in chosen groups of spermaphytes or sporophytes, or from selected geographic areas, in connection with considerations of genealogic development, geographic distribution, and inter-related association.

103. BACTERIOLOGY.—Investigations upon morphologic and physiologic variation due to treatment; systematic studies upon the number, validity, and relationship of species; researches upon special saprophytic or parasitic kinds of bacteria and upon methods of favoring or combating their activities.

104. EVOLUTION OF PLANTS.—Observations and experiments

upon plants and studies in related literature, in gaining information upon such topics as the following: The influence of environment, effects of self and cross fertilization, tendencies of variation, philosophy of selection, nature and laws of heredity.

CHEMISTRY

1. MINOR COURSE.—ELEMENTARY AND EXPERIMENTAL CHEMISTRY.—This course deals with the general principles of the science, the few typical elements and compounds which are studied being considered largely for the purpose of illustration.

The laboratory work comprises a series of such experiments, many of them quantitative, as serve best to illustrate the relations between the observed facts and the general principles, and to familiarize the student with the methods of chemistry. *Remsen's Introduction to Chemistry. Fall term, Lecture, M., Tu., W., F., at 1.20.—Laboratory, Sec. A, M., W., F., at 8; Sec. B, M., Th., at 2.20, and Sat., at 8; Sec. C (Engineers only), Tu., F., at 2.20, full credit.* Professor PALMER, Assistant Professor GRINDLEY, and Mr. SAMMIS.

2. DESCRIPTIVE INORGANIC CHEMISTRY.—This course is required of all chemical students. It is mainly devoted to a study of the metallic elements, their classification, compounds, and chemical properties. The work is from lectures and assigned text, without laboratory work. *Remsen's Advanced Course. Winter and spring terms, M., W., F., at 8, three-fifths credit.* Assistant Professor GRINDLEY.

Required: Chemistry 1.

2a. INORGANIC PREPARATIONS.—This is a laboratory course designed to accompany the descriptive work of course 2. The work includes the precipitation, crystallization, and purification of various salts, the material being largely obtained from laboratory wastes. *Spring term, at 10, full credit.* Assistant Professor GRINDLEY.

3a. QUALITATIVE ANALYSIS.—This course includes a study of salts, their formation, solubilities, chemical reactions, etc. The periodic classification of the elements is made the basis for developing the principles of analysis. The work in the laboratory, after illustrating these principles, is occupied with the determination of base and acid constituents of a given number of unknown substances. *Winter term, lecture, Tu., and Th., at 3:05; laboratory, at 10.10, and 1.15, full credit.* Assistant Professor GRINDLEY and Mr. SAMMIS.

Required: Chemistry 1.

3b. Qualitative Analysis, continued with more complex substances.—A comparative study of methods, difficult separations, problems in synthesis, etc. *Spring term, lecture, Tu., and Th., at 3.20; laboratory, at 1.20, full credit.* Assistant Professor Grindley and Mr. Sammis.

Required: Chemistry, 1, 2.

3c. Qualitative Analysis, same as 3b, but requiring only half time and constituting a half course. *Spring term, 6 hours per week, half credit.*

Required: Chemistry 1, 2, and 3a.

4 Elements of Organic Chemistry, Minor.—A course in organic chemistry, provided more especially for students who are not making a specialty of chemistry. The instruction is directed mainly to the consideration of the general characteristics and the mutual relations of some of the most important classes of carbon compounds, and the course constitutes a general introduction to the principles and the methods of organic chemistry. In the laboratory a few typical substances are prepared. *Remsen's Organic Chemistry. Spring term, lecture, M., W., F., at 10; laboratory, Tu., Th., at 10, full credit.* Professor Palmer.

Required: Chemistry 3a, and either 3b, or 3c.

5a. Quantitative Analysis.—General principles and practice of gravimetric quantitative analysis, beginning with salts of definite composition. Lectures and assigned text from *Fresenius's Quantitative Analysis* accompanying the laboratory work. *Fall term, lecture, M., at 1.20; laboratory, at 2.20, full credit.* Professor Parr and Mr. Rose.

Required: Chemistry 3a, and either 3b, or 3.

5b. Quantitative Analysis, continued.—This course includes volumetric analysis and the analysis of silicates, as feldspars, clays, etc. *Winter term, lecture, Tu., Th., at 11.05; laboratory, 10 hours a week, to be arranged, full credit.* Professor Palmer and Mr. Rose.

Required: Chemistry 5a.

5c. Examination and Analysis of Foodstuffs, Milk, Butter, etc. Sanitary Examination of Air, or Analysis of Agricultural Products, Materials, Fertilizers, etc.—*Spring term, lecture, M., at 11; laboratory, at 9, full credit.* Professor Palmer and Assistant Professor Grindley.

Required: Chemistry 5b.

6. TECHNOLOGICAL CHEMISTRY.—This is a course of lectures, comprising a study of technological chemistry as illustrated in those industries having a chemical basis for their principal operations and processes. Much use is made of the journals. *Winter term, M., W., F., at 10.10; spring term, M., W., F., at 11, half credit.* Professor PARR.

Required: Chemistry, 2, 3b.

7. PHYSICAL CHEMISTRY.—A course in physical chemistry, including thermo-chemistry, consisting mainly of laboratory work. It comprises determinations of vapor density, specific heat, depression of freezing point, elevation of boiling point, and calculation of molecular and atomic weights from the data thus obtained, and the use of calorimeter, polariscope, and other instruments, in determining such constants as serve in characterization or for quantitative estimation of chemical substances, or which serve as the basis of theoretical generalizations. *Fall, winter, or spring term, full credit.* Professor PALMER.

Required: Chemistry 2, 5b; Physics 1, 3.

8. IRON AND STEEL ANALYSIS.—Methods for determination of all the constituents are studied, including both rapid and standard methods, especial attention being given to technical methods for determination of phosphorus and sulphur. *Spring term, lecture, Th., at 11; laboratory, at 9, full credit.* Professor PARR and Mr. ROSE.

Required: Chemistry 5b.

9. ORGANIC CHEMISTRY.—The work of this course consists in the detailed discussion of the characteristics of several of the more typical and simple organic compounds, followed by the briefer consideration of most of the important classes of the derivatives of carbon. *Bernthsen's Organic Chemistry* is used as reference and text-book. The laboratory work includes the preparation of organic compounds in accordance with the directions given in *Gatterman's Practical Methods of Organic Chemistry,* and the ultimate analysis of the finished products. *Winter and spring terms, at 1.15, full credit.* Professor PALMER and Mr. ROSE.

Required: Chemistry 2, 5a.

10. SANITARY ANALYSIS.—One term is devoted to the chemical examination of potable and mineral waters. Detection and estimation of some of the most important poisons, organic and inorganic. *Fall term, at 10, one credit.* Professor PALMER and Mr. ROSE.

Required: Chemistry 5a.

11. INVESTIGATIONS AND THESIS.—Candidates for graduation from the chemical courses are required to devote at least three hours per day for two terms to the investigation of some selected chemical subject, the results of which are to be embodied in a thesis. The subject must be determined upon by consultation with the professors of chemistry before the first Monday in November. Between that time and the beginning of the winter term an index to the bibliography of the subject must be prepared and presented to the professor in charge of the investigation. *Winter and spring terms, full credit.* Professor PALMER, Professor PARR, Assistant Professor GRINDLEY.

Required: Chemistry, 11 credits.

12. THEORETICAL CHEMISTRY.—A course of instruction which includes discussions of the principles and theories of general chemistry. *Ostwald's Outlines of General Chemistry. Winter term, three-fifths credit; spring term, two-fifths credit.* Professor PALMER.

Required: Chemistry 4, and 5a.

13. AGRICULTURAL CHEMISTRY.—A course of lectures upon the chemical principles and processes involved in agriculture, taken conjointly with laboratory practice in analysis of agricultural products and materials. The work includes the quantitative separation and estimation of the constituents of agricultural products, analysis of fertilizers, soils, rain and drain waters, plants, foods, dairy products, etc. The first term's work is united with Chemistry 5a. *Fall, winter, and spring terms, at 10, full credit.* Assistant Professor GRINDLEY.

Required: Chemistry 4.

14. METALLURGY.—Special attention is given to the effect of impurities in ores upon metallurgical processes and finished products. Fuels, refractory materials, and fluxes are described and their value and application explained. A series of lantern slides illustrating actual plants in operation together with specimens of furnace material and products are used in illustration. Much use is made of journals, annuals, and monographs setting forth the best practice. *Fall term, at 11, full credit.* Professor PARR.

Required: Chemistry 5b.

15. (a) METALLURGICAL CHEMISTRY.—This course includes the wet assay of copper, lead, zinc, and other ores, arsenical and complex as well as the simpler forms, also the analysis of finished metallurgical products; as, commercial lead, spelter, copper, etc.; during the last half of the term the work is occupied with the fire assay of

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lead, gold, and silver ores. Fluxes, reagents, and charges are studied in connection with various typical ores and practice given in use of the crucible and muffle furnaces and in the manipulations connected with fire assaying. *Fall term, lecture, M., Th., at 3.20; laboratory at 1.20, full credit.* Professor PARR and Mr. ROSE.

Required: Chemistry 5b.

(b) ELECTRO-METALLURGY.—A study of the methods employed in the electrolytic separation and refining of metals, treatment of ores, etc. The laboratory work involves practice in actual separations, a quantitative check being made on all results. *Winter term, lecture, M., Th., at 3.20; laboratory, at 1.20, full credit.* Professor PARR.

Required: Chemistry 5b.

(c) ELECTRO-CHEMICAL ANALYSIS.—A study of methods and practice in quantitative determination by electrolytic separation and deposition of metals and compounds. *Spring term, lecture, M., Th., at 3.20; laboratory, at 1.20, full credit.* Professor PARR and Mr. ROSE.

Required: Chemistry 5b.

16. CHEMISTRY FOR ENGINEERS.—This course is arranged particularly for mechanical engineers. It involves the proximate analysis of coals, determination of calorific power, technical analysis of furnace gases, examination of boiler waters, etc. *Winter term, at 10.10, full credit.* Professor PARR and Mr. SAMMIS.

Required: Chemistry 1.

17. INDUSTRIAL CHEMISTRY.—A laboratory course in the preparation of chemical products from raw materials. The manufacture and proving of pure chemicals, fractionation, and other processes of the manufacturing chemist. *Winter term, full credit.* Professor PARR.

Required: Chemistry 5b.

18. SPECIAL ADVANCED COURSES.—Special laboratory courses as indicated below may be arranged for those competent to pursue them. From one-fifth to three credits will be allowed in the undergraduate courses for such work.

(a) Technical Gas Analysis, 1/5 to 1 credit.

(b) Urinalysis, 2/5 to 1 credit.

(c) Toxicology, 2/5 to 2 credits.

(d) Metallurgical Chemistry, 1 to 3 credits. Professors PALMER and PARR.

19. SEMINARY.—Reports and discussions upon assigned topics from current chemical literature. One session each fortnight during

the junior and senior years. *Two credits.* Professor PALMER and Mr. ROSE.

20. QUANTITATIVE ANALYSIS.—An elementary course intended especially for such students of other departments as desire some training in the process of quantitative analysis, but have not the time or the opportunity to enter the regular course in this subject. The work may vary in character, to some extent, according to the need of the individual student. *Spring term, at 10, full credit.* Professor PALMER and Mr. ROSE.

Required: Chemistry 3a.

21. PROXIMATE ORGANIC ANALYSIS.—One or two terms' work, mainly devoted to proximate analysis of organic compounds and mixtures of natural occurrence or of other origin. The work is both qualitative and quantitative, and includes determinations of the more important alkaloids, carbohydrates, acids, and other essential constituents of organic substances. *Dragendorf's Plant Analysis; Prescott's Organic Analysis; Allen's Commercial Organic Analysis; Lyon's Pharmaceutical Assaying. Winter or spring term, full credit.* Professor PALMER.

Required: Chemistry 4 and 5b.

22. PHOTOGRAPHY.—Courses in photography will be arranged when called for by a sufficient number of students, as follows:

(a) Elementary. (b) Advanced. (c) Micro-photography.

Spring term, lecture at 8; laboratory, by arrangement; half credit. Professor PARR.

COURSES FOR GRADUATES

101. Research work in organic chemistry.
102. Research work in general inorganic chemistry.
103. Research work in agricultural chemistry.
104. Investigations of heating power of fuels.
105. Research in metallurgical chemistry.
    (*a*) Action of solvents in extraction of gold and silver from their ores.
    (*b*) Methods of analysis of ores and products.

CIVIL ENGINEERING

1. LAND SURVEYING.—Areas and distances by chain, compass, and plane table; U. S. public land surveys, including legal points involved in the reëstablishment of boundaries; magnetic variation and determination of true meridian. The students solve numerous problems in the field with instruments. To facilitate practice in sur-

veying, an area has been specially prepared in which the difficulties of plane surveying are presented to the beginner as he is able to meet them, and where he is taught practical methods of overcoming them. *Bellows and Hodgman's Surveyor's Manual. Fall term, at 1.20, full credit.* Assistant Professor PENCE.

Required: General Engineering Drawing 1, 2, 3, 4; Math. 4.

2. TOPOGRAPHICAL DRAWING AND SURVEYING.—Topographical drawing is given during the bad weather of the winter term. The student spends about half a term making the standard topographical symbols. During the spring term topographical surveying is taught, in which students solve problems with the plane table and the stadia, and make a topographical survey and plot the notes. This and course 3 must be taken together. *Winter and spring terms, at 1.15, full credit.* Assistant Professor PENCE.

Required: Civil Engineering 1.

3. TRANSIT SURVEYING AND LEVELING.—Construction, adjustment, and use of the transit and level; angles, inaccessible distances, and areas with the transit; profiles and contours with the level. The department is provided with the instruments necessary for the different branches of engineering field practice. These instruments are in constant use by the students whenever the weather permits. This and course 2 must be taken together. *Baker's Engineers' Surveying Instruments. Winter and spring terms, at 1.15, full credit.* Assistant Professor PENCE.

Required: Civil Engineering 1.

4. RAILROAD ENGINEERING.—In the field practice the class makes preliminary and location surveys of a line of railroad of sufficient length to secure familiarity with the methods of actual practice. Each student makes a complete set of notes, maps, profiles, calculations, and estimates. *Godwin's Railroad Engineers' Field-Book, and Tratman's Track. Fall term, at 10.10, full credit; winter term, M., Tu., at 10, half credit.* Assistant Professor PENCE.

Required: Civil Engineering 1, 2, 3.

5. MASONRY CONSTRUCTION.—The students have experiments in the masonry laboratory, in testing cement, mortar, stone, and brick. *Baker's Masonry Construction. Fall term, at 8; laboratory, Tu., and Th., at 1.20, full credit.* Professor BAKER.

Required: Theoretical and Applied Mechanics 1, 2; General Engineering Drawing 1, 2, 3, 4.

6. GEODESY.—Geodesy is taught by lectures and assigned reading. Problems are solved in barometrical, trigonometrical, and pre-

cise leveling, and in reading horizontal angles. *Winter term, at 10.10, half credit.* Professor BAKER.

Required: Math. 4; General Engineering Drawing 1, 2, 3, 4; Civil Engineering 1, 3; Descriptive Astronomy 2.

10. SURVEYING.—For students in the courses of architecture, architectural engineering, electrical engineering, and mechanical engineering. Areas with chain and compass, U. S. public land surveys, and principles of reëstablishing corners; use of transit in finding distances, areas, and in laying out buildings; use of the level in finding profiles and contours. *Baker's Engineers' Surveying Instruments. Spring term, at 8 and at 10, full credit.* Assistant Professor PENCE.

Required: Math. 4; General Engineering Drawing 1, 3, 4; Physics 1.

12. BRIDGE ANALYSIS.—Instruction and practice are given in the computation of the stresses in the various forms of bridge trusses, by algebraic and graphical methods, under different conditions of loading. *Johnson's Modern Framed Structures. Fall term, at 9, full credit.* Professor BAKER.

Required: Theoretical and Applied Mechanics 1, 2; Architecture 6.

13. BRIDGE DETAILS.—The student makes a tracing of a shop drawing of a bridge, and then makes a critical report upon each element of the design and computes the cost. Afterwards a comparative study is made of the several forms of details employed by leading designers. *Winter term, at 8.20, full credit.* Professor BAKER.

Required: Civil Eng'g 12 and free-hand sketches with dimensions, showing full details of a bridge measured by the student.

14. BRIDGE DESIGN.—Each student designs a bridge, proportioning the sections and working out the details, and afterwards makes a complete set of drawings. *Spring term, at 10, full credit.* Professor BAKER.

Required: Civil Engineering 12, 13.

15. TUNNELING.—This subject is given by lectures and assigned reading. Students are required to make written reports upon the methods employed in particular tunnels. Some time is given to practice in boring wells, dredging, quarrying, and sub-aqueous blasting. *Winter term, at 10.10, half credit.* Professor BAKER.

Required: Math. 2, 4, 6; General Engineering Drawing 1, 2, 3, 4; Mechanical Engineering 1, 16, 17; Chemistry 1; Physics 1.

16. ENGINEERING CONTRACTS AND SPECIFICATIONS.—A study is

made of the fundamental principles of the law of contract, and of examples of the general and technical clauses of various kinds used in engineering specifications. *Johnson's Engineering Contracts and Specifications. Spring term, at 8, two-fifths credit.* Professor BAKER.

Required: Civil Engineering 5, 12, 13; Municipal and Sanitary Engineering 2, 3.

17. RAILROAD STRUCTURES.—Instruction is given by lectures and references to standard authorities. Current practice is studied by the examination of existing structures and by means of a collection of the standard drawings of leading railroads. *Winter term, W., Th., F., at 10.10, three-fifths credit.* Assistant Professor PENCE.

Required: Civil Engineering 4.

COURSES FOR GRADUATES

All primary unless otherwise stated. Each one credit.

101. Location and Construction.

102. Railway Track and Structures, and their Maintenance.

103. Yards and Terminals.

104. Motive Power and Rolling Stock.

105. Signal Engineering.

106. Railway Operation and Management.

107. Bridge Designing.

108. Cantilever and Swing Bridges.

109. Metallic Arches.

110. Metallic Building Construction.

111. Roof Construction.

112. Stereotomy.

113. History of the Development of Bridge Building—Secondary.

128. Practical Astronomy.

129. Description of Work Done.

130. Critical Description of Engineering Construction.

131. Translation of Technical Engineering Work from French or German.

132. Any Primary in Theoretical and Applied Mechanics or Municipal and Sanitary Engineering.

133. Any Primary in Mathematics, Mechanical Engineering, or Electrical Engineering—Secondary.

134. Indexing of Civil Engineering Periodical Literature—Secondary.

DRAWING, GENERAL ENGINEERING

1. ELEMENTS OF DRAFTING.—This work is designed as a general preparation for drafting in all its branches. The problems are arranged so as to be of practical benefit and are designed to throw the student on his own ingenuity in aplying the principles learned. This course includes in all about thirty plates. *Lectures and notes. Fall term, at 8, at 10, and at 1.20, full credit.* Assistant Professor PHILLIPS and Mr. WEBBER.

2. DESCRIPTIVE GEOMETRY.—This term's work includes problems relating to the point, line, and plane; the generation and classification of lines and surfaces; planes tangent to surfaces of single and of double curvature; intersections, developments, and revolutions. The application of principles and methods in numerous and varied practical problems is a large part of the work. *Church's Descriptive Geometry. Winter term, at 8.20, at 10.10, and at 1.15, full credit.* Assistant Professor PHILLIPS and Mr. WEBBER.

Required: General Engineering Drawing 1.

3. LETTERING.—Plain and ornamental alphabets; free-hand and mechanical lettering; titles and title pages. *Lectures and Notes. Spring term, at 8, at 10, and at 1.20, half credit.* Assistant Professor PHILLIPS and Mr. WEBBER.

Required: General Engineering Drawing 1.

4. SKETCHING.—In perspective and orthographic projections. Architectural sketch plans and details; machines, machine parts, and mechanisms. Lectures and notes. *Spring term, at 8, at 10, and at 1.20, half credit.* Assistant Professor PHILLIPS and Mr. WEBBER.

Required: General Engineering Drawing 1, 2.

5. ADVANCE DESCRIPTIVE GEOMETRY.—Curved lines of the higher orders; higher singe curved, warped and double-curved surfaces. *Church's Descriptive Geometry*, with references to *Warren's General Problems from the Orthographic Projections of Descriptive Geometry. Spring term, at 8, at 10, and at 1.20, three-fifths credit.* Assistant Professor PHILLIPS.

Required: General Engineering Drawing 1, 2.

ECONOMICS

1. Introductory Course: This is a beginners' course, consisting of two parts:

a. PRINCIPLES OF ECONOMICS.—This course is intended to give a general survey of the field of the science. *Fall and winter terms, M., W., F., at 11, three-fifths credit.* Dr. HAMMOND.

b. Economic History of England and the United States.—This course is intended to sketch the industrial development of these two nations. An effort will be made to show the relations between the facts of history and the economic principles discussed in course 1. This course should accompany course 1 and will be required of all students in the political science group. *Fall and winter terms, Tu., Th., at 11, two-fifths credit.* Dr. Hammond.

2a. Money and Banking.—In this course a study of the history and functions of money is followed by a study of the monetary and banking history of the United States and of such topics as the theory of prices, credit, government paper, etc. *Winter and spring terms, M., W., F., at 11, three-fifths credit.* Professor Kinley.

Required: Economics 1a.

3a. Financial History of the United States.—This course begins with Hamilton's administration of the treasury. It deals with the growth and management of the national debt, and with the industrial expansion and the tariff history of the country. For graduate students the course will be purely investigative. *Fall and winter terms, M., W., F., at 9, three-fifths credit.* Professor Kinley.

Required: Economics 1. (Not given in 1898-99.)

5. The Transportation Problem.—This is a course designed to familiarize the student with the problems of transportation, especially by railways, in their economic and social aspects. A comparative study is made of the development, management, and regulation of railways in Europe and the United States. *Spring term, three-fifths credit.* Dr. Hammond.

Required: Economics 1. The course is open, without the requirement in economics, to students in the College of Engineering who have taken Civil Engineering 4. (Not given in 1898-99.)

6. Sociology.—In this course it is intended to study society in its normal structure. The theories of the nature of society, which have been advanced by various writers, are discussed in the light of the history of social institutions, and an effort is made to formulate some of the laws of social growth. *Fall and winter terms, Tu., Th., at 9, two-fifths credit.* Dr. Hammond.

Required: Economics 1, or some course in history, philosophy, psychology, or biology. (Not given in 1898-99.)

7. Social Pathology.—This is a course in "applied sociology," consisting of as detailed a study of the problems of pauperism and crime as the time will permit, together with a consideration of theories and methods of reform. *Spring term, Tu., Th., at 9, two-fifths credit.* Dr. Hammond. (Not given in 1898-99.)

8. Economic Seminary.—Advanced students will be formed into a seminary for investigation and for the study of current economic literature. Students who write their theses in economics must do so in connection with the seminary work. The course counts for *two credits. Fall, winter, and spring terms, two hours once each week.* Professor Kinley and Dr. Hammond.

9. Economics of Agriculture.—This is a course especially prepared for the students of the Winter School in Agriculture (p. 129). The first half of the term is devoted to a study of the elements of economics, while the second deals primarily with those portions of theoretical and practical economics which relate to agriculture. *Winter term.* Dr. Hammond.

10. Principles of Economics.—This is a one term course in general economics offered primarily to junior and senior engineering students of high standing. Under no circumstances will a student be admitted before his junior year. Stress is laid on the practical side of economic questions. *Fall term, at 2.20, full credit..* Professor Kinley.

11. The Money Market.—This is an advanced course in the history and theory of price, credit, and foreign exchange. The theory of international trade, the stock exchange and the produce exchange are among the subjects studied. *Spring term, at 1.20, three-fifths credit.* Professor Kinley.

Required: Economics 1a and 2a.

12. Public Finance.—This course consists of a critical and comparative study of financial theories and methods. Especial attention is directed to American conditions. Public expenditure and its relation to the various sources of revenue; taxation, its theory, incidence, and methods; public debts, financial administration, and the financial relations of the various organs of government are discussed at length. *Fall, winter, and spring terms, at 9, three-fifths credit.* Dr. Hammond.

Required: Economics 1.

13. The Labor Problem.—This course is a study of the condition of labor, past and present. Readings, lectures, and quizzes. *Fall term, M., W., F., at 11, three-fifths credit.* Professor Kinley.

Required: Economics 1.

14. The Monopoly Problem.—This is a study of the economic aspects of monopoly, the limits of competition, and the relation of monopoly to the public welfare. *Winter term, at 11, three-fifths credit.* Professor Kinley.

15. THE TARIFF PROBLEM.—This course deals briefly with the various protection theories that have been advanced in this country and with the history of the tariffs and their influence upon the social and industrial development of the United States. Lectures, assigned readings, and discussions. *Spring term, at 11, three-fifths credit.* Dr. HAMMOND.

Required: Economics 1.

16. STATISTICS.—A short course open to those who have had economics 1 and recommended to all who intend to take the advanced courses in economics. It will be of a practical character, intended to furnish a knowledge of the statistical method, its limitations and abuses, and to enable the student to find and make use of government reports, statistical publications, etc. *Spring term, Tu., Th., at 11, two-fifths credit.* Dr. HAMMOND.

17. THEORIES OF PRODUCTION AND CONSUMPTION.—This course is a study of the conditions of social prosperity as dependent on production and consumption. The course is open to graduates, and to undergraduates who have had one full year of economic study. *Fall and winter terms, at 11, two-fifths credit.* Professor KINLEY. (Not given in 1898-99.)

18. DISTRIBUTION.—This course deals with the problem of distribution of wealth, but on the side of practical measures rather than of pure theory. It includes, therefore, a discussion of private property, of socialism and communism, and of sundry proposals, like the single-tax, for correcting the inequalities of wealth without fundamental changes in the structure of society. *Fall, winter, and spring terms, at 11, two-fifths credit.* Professor KINLEY.

Required: 3 credits in economics; or, economics 1a and either anthropology 1, zoölogy 1c, or public law 1.

For other work open to those who have had one full year's work in economics see the courses for graduates.

COURSES FOR GRADUATES

(These courses are open to students who have had one full year's work in economics.)

101. THE THEORY OF VALUE.—This is a historical and critical study of theories of value. Special attention is paid to recent development. *Fall and winter terms, twice a week.* Professor KINLEY. (Not given in 1898-99.)

102. THE THEORY OF DISTRIBUTION.—A study of theories of rent, wages, interest and profits. *Fall, winter, and spring terms, twice a week.* Professor KINLEY.

ELECTRICAL ENGINEERING

1. Electrical Engineering.—A short course of lectures with laboratory practice, intended for students in mechanical engineering and for others who require only a very general acquaintance with dynamo-electric machinery and its use for lighting and power purposes. *Spring term, lecture, Tu., Th., F., at 2.20; laboratory, Sec. A, M., at 1.30; Sec. B, W., at 1.30, full credit.* Assistant Professor Swenson.

3a. Dynamo-Electric Machinery.—Lectures on theory of dynamo-electric machinery, particularly direct-current machines, with experimental study of the same in the dynamo laboratory. The course includes the theory and use of the instruments used in dynamo testing. *Fall term, lecture, M., W., F., at 1.20; laboratory, Tu., Th., Sat., at 9, and M., Th., F., at 2.20, full credit.* Assistant Professor Swenson.

Required: Physics 4 and Electrical Engineering 11.

3b. Design of Electro-Magnets and Direct Current Machinery.—Drafting, with supplementary lectures on the practical construction of electro-magnetic mechanisms and dynamo-electric machines. Each student designs one or more electro-magnets for specific duty, and a direct-current dynamo machine, and prepares detailed drawings of the same. *Fall term, lecture, Th., at 1.20, and Sat., at 8; drafting, M., Th., F., at 2.20, and Tu., Th., Sat., at 9; three-fifths credit.* Assistant Professor Esty.

Required: Physics 4 and Electrical Engineering 11.

4a. Alternating Currents and Alternating Current Machinery.—Lectures on the theory and application of alternating electric currents, with very complete experimental study of alternating current instruments and apparatus. There will be a short course on electro-motive forces of higher frequency and the modern views of electricity. *Winter and spring terms, lecture, M., W., F., at 1.15; laboratory, arrange; full credit.* Professor Carman and Assistant Professor Swenson.

4b. Design of Alternating Current Machinery.—Drafting and lectures. Design and construction of alternating current transformers, alternators, and alternating current motors. Typical examples of alternating current apparatus are designed and detailed drawings made. *Winter and spring terms, lecture, W., at 8.20; drafting, arrange; three-fifths credit.* Assistant Professor Esty.

Required: Electrical Engineering 3b.

5. PHOTOMETRY.—Lectures and laboratory. Study of arc and incandescent lamps in connection with their use in electric lighting. *Winter term, lecture, Th., at 1.15; laboratory, arrange; two-fifths credit.* Assistant Professor SWENSON.

Required: Electrical Engineering 3.

6. TELEGRAPHY AND TELEPHONY.—Lectures and practice. This course includes the methods of telegraphy, the theory of the telephone, and telephone engineering with special reference to the construction, testing, and protection of lines. Visits to the local telephone exchanges are made, and reports on the systems required. *Fall term, Tu., Th., at 8, two-fifths credit.* Assistant Professor ESTY.

7. ELECTRO-METALLURGY.—A short course of lectures during the winter term. Assistant Professor ESTY.

Required: Chemistry 1 and Electrical Engineering 3.

8. ELECTRIC LIGHTING.—Lectures and drafting. In this course are studied methods of wiring for arc and incandescent lighting; the discussion of fire insurance rules and regulations; the installation, operation, and economical management of central stations; use of accumulators, compensators, and other regulators; consulting engineering. A part of the instruction is to have the student make working plans, specifications, and estimates of a complete installation of a plant for a particular locality whose local conditions are known. *Winter term, lecture, M., F., at 8; drafting, arrange; full credit.* Assistant Professor ESTY.

Required: Electrical Engineering, 3, 4, 5.

9. ELECTRICAL TRANSMISSION OF POWER.—Lectures and drafting. The construction, equipment, and operation of electric railways and power stations; the utilization of water power; long distance transmission of electric power; the application of electric motors to general power distribution; consulting engineering. Visits to the plant of the local light and power company form a part of the instruction, and full reports on the installation are required. Plans, specifications, and estimates are prepared by each student for a power plant at some particular location. *Spring term, lecture, M., F., at 8; drafting, arrange; full credit.* Assistant Professor ESTY.

Required: Electrical Engineering 8.

10. SEMINARY.—A weekly meeting of instructors and students is held in the department reading room for discussion of topics from the current journals of theoretical and applied electricity. Papers on any original work doing in the department also come up for discussion. *Fall, winter, and spring terms, Tu., at 2.20, one-fifth credit.* Professor CARMAN.

11. Elements of Dynamo-Electric Machinery.—A course of lectures introductory to the fuller courses of the fourth year, and required of third year students in electrical engineering. *Spring term, lecture, Tu., Th., at 1.20, half credit.* Assistant Professor Swenson.

Required: Two terms of Physics 4.

COURSES FOR GRADUATES

Primary

101. Mathematical Theory of Electricity and Magnetism, 1, 2, or 3 credits.

102. Absolute Measurements in Electricity and Magnetism, 1, 2, or 3 credits.

103. Dynamo Electric Machinery, 1, 2, or 3 credits.

104. Electrical Transmission of Power, 1, 2, or 3 credits.

105. Electro-Metallurgy, 1, 2, or 3 credits.

106. Photometry, 1, 2, or 3 credits.

107. Calorimetry, 1, 2, or 3 credits.

108. Economy of Production and Utilization of Electrical Energy, 1 credit.

109. Consulting Engineering, 1 credit.

Secondary

110. Mathematics, 1, 2, or 3 credits.

111. Physics, 1, 2, or 3 credits.

112. Language, 1, 2, or 3 credits.

113. Chemistry, 1, 2, or 3 credits.

114. Architectural Engineering, 1, 2, or 3 credits.

115. Civil Engineering, 1, 2, or 3 credits.

116. Municipal and Sanitary Engineering, 1, 2, or 3 credits.

117. Mechanical Engineering, 1, 2, or 3 credits.

118. Translation of Technical Engineering Works, 1, 2, or 3 credits.

ENGLISH LANGUAGE AND LITERATURE

1. General Survey of English Literature.—*Fall, winter, and spring terms, at 9, at 11, and at 2.20; two-fifths credit.* Professor Dodge.

2. Prose Writers of the Eighteenth and Nineteenth Centuries.—*Fall, winter, and spring terms, M., W., F., at 9 and at 2.20; three-fifths credit.* Assistant Professor Jayne.

Required: English 1, except for engineers.

3. Nineteenth Century Poetry.—*Fall, winter, and spring terms, M., W., F., at 10; three-fifths credit.* Assistant Professor Jayne.

Required: English 1 and 2.

4. Prose Writers of the Sixteenth and Seventeenth Centuries.—*Fall, winter, and spring terms, Tu., Th., at 10; two-fifths credit.* Professor Dodge.

4a. Non-Dramatic Poetry of the Sixteenth and Seventeenth Centuries. This course alternates with 4. *Fall, winter, and spring terms, Tu., Th., at 10; two-fifths credit.* Professor Dodge. [Not given in 1898-99.]

5. Shakspere and History of the Drama.—Primarily for graduates. *Fall, winter, and spring terms, M., W., F., at 9; three-fifths credit.* Professor Dodge.

Required: English 1, 2, 3, 4.

6. History of English Criticism.—Primarily for graduates. *Fall, winter, and spring terms, Tu., Th., at 11; two-fifths credit.* Professor Dodge.

Required: English 1, 2. 3, 4.

7. Seminary: Comparative Modern Fiction.—Open only to senior and graduate students. *Fall, winter, and spring terms, one-fifth credit.* Assistant Professor Jayne.

8. Old English (Anglo-Saxon) Grammar and Prose.—*Fall, winter, and spring terms, three-fifths credit.* Professor Dodge.

9. Early English.—*Fall, winter, and spring terms, two-fifths credit.* Professor Dodge.

10. Old English Poetry.—*Fall, winter, and spring terms, three-fifths credit.*—Professor Dodge.

Required: English 8.

11. Fourteenth and Fifteenth Century Literature.—*Fall, winter, and spring terms, two-fifths credit.* Professor Dodge.

Required: English 8 and 9.

12. History of the English Language.—One hour a week. *Fall, winter, and spring terms, two-fifths credit.* Professor Dodge.

Required: English 8 and 9.

13. Icelandic.—*Fall, winter, and spring terms, full credit.* Professor Dodge.

Required: English 8 and 9, or German 1.

14. Old English Legal Codes.—Special course for students of politics, economics, and history. As an introduction to the course Old English Grammar is studied so far as is necessary for a proper

understanding of early phraseology. Primarily for graduates, but open to under-graduates having sufficient preparation. *Fall, winter, and spring terms, two-fifths credit.* Professor Dodge.

Required: One year of history, economics, sociology, or English literature.

15. Seminary: Methods of English Teaching.—Open to senior and graduate students. *Fall, winter, and spring terms, one-fifth credit.* Professor Dodge and Assistant Professor Jayne.

FRENCH

1. Elementary Course.—The course embraces grammatical study, pronunciation, exercises in composition, and conversation. Reading of representative works of modern authors, such as Halévy, Labiche, Daudet, Jules Verne, and others. *Fall, winter, and spring terms, at 8 and at 10, full credit.* Assistant Professor Piatt and Mr. Carnahan.

2. Nineteenth Century.—(1) The class will read works of Mérimée, George Sand, Balzac, Sandeau, Bourget, Hugo, and others. (2) Outlines of French literature. (3) Assigned readings and reports thereon. *Fall, winter, and spring terms, at 8, full credit.* Assistant Professor Fairfield.

Required: French 1 or 5.

3. Seventeenth Century.—(1) Readings from Molière, Corneille, Racine, Lafontaine, Boileau, de Sévigné, and others. (2) Study of French literature and civilization of the century. (3) Advanced composition. (4) Assigned readings. *Fall, winter, and spring terms, at 1.20, full credit.* Assistant Professor Fairfield.

Required: French 2.

4. Eighteenth Century.—(1) The course will consist of lectures in French, themes, and collateral reading. Reading of selected works of Voltaire, Montesquieu, Rousseau, Chénier, and Beaumarchais. (2) Assigned readings. (3) Themes in French upon subjects connected with the course. *Fall, winter, and spring terms, at 10, full credit.* Assistant Professor Fairfield.

Required: French 3.

5. Scientific and Technical French.—Similar to course 1 for first two terms. In the spring term this class will be divided into sections for the study of scientific and technical French, suited to the demands of the several colleges, each student working in his own special line. Particular attention will be given to acquir-

ing a technical vocabulary and to rapid reading. *Fall, winter, and spring terms, at 9 and at 2.20, full credit.* Assistant Professor PIATT.

COURSES FOR GRADUATES

101. (a) OLD FRENCH READINGS.—Clédat, Les Auteurs Français du Moyen Age; Suchier, Aucassin et Nicolete; Gautier, La Chanson de Roland. Translation and comparison with the modern idiom. Study of the laws of phonetic changes. Lectures upon Old French philology.

(b) A SYSTEMATIC STUDY OF SPECIAL TOPICS.—French poets of the sixteenth century. Malherbe; his school and his influence. Sacred eloquence of the seventeenth century.

GEOLOGY

1. GEOLOGY, MAJOR COURSE.—(a) Dynamic Geology. The instruction given under this head is intended to familiarize the student with the forces now at work upon and within the earth's crust, modeling its reliefs, producing changes in the structure and composition of its rock masses and making deposits of minerals and ores. A series of localities is studied in which great surface changes have recently taken place, with a view to ascertaining the character of the forces producing such changes, and the physical evidence of the action of like forces in the past. The subject is taught by lectures, and is abundantly illustrated by maps, models, charts, and views. (11 weeks, 5 hours per week.)

(b) Petrographic Geology. The instruction under this topic is given by lectures and laboratory work. The subjects included are the classification of rocks, the methods used in their determination, the conditions governing the formation of each species, the decompositions to which they are liable, and the products of these decompositions. Each student is supplied with a set of blowpipe tools and reagents, and a series of hand specimens covering all the common species of rocks. (11 weeks, 5 hours per week.)

(c) Historical Geology. The work on this subject is substantially an introduction to the history of geology as a science. So far as may be done with the data in hand, an attempt is also made to trace the history of each geological period. (10 weeks, 5 hours per week.)

(d) Paleontology. The scheme of instruction in this subject places before the student the classification adopted for those organic forms occurring as fossils, together with the succession of the vari-

ous groups that occur in the strata, with the cause, as far as known, for their appearance and disappearance. The student is required to familiarize himself with selected groups of paleozoic fossils, abundant illustrations of which are placed in his hands. The subject is presented in lectures and demonstrations, each group being considered in connection with its nearest living representative. (10 weeks, 5 hours per week.)

(e) Economic Geology. The final term of this course is devoted to a study of the uses man may make of geologic materials, the conditions under which these materials occur, and the qualities which render them valuable. The instruction is given by text and readings from the various state and government reports, transactions of societies, and monographs in which these subjects are treated, as well as by demonstrations with materials from the collections of the University. (14 weeks, 10 hours per week.)

In dynamic and historical geology Dana's manual is used as a reference book, and in economic geology Tarr's Economic Geology of the United States. Petrography is pursued by means of a laboratory guide adapted from Rosenbusch, Zirkel, Roth, Teall, and others. In economic geology the manuals of Kemp and Tarr are used as texts. In paleontology Nicholson, Bernard, and Zittel are used for descriptions of the larger groups, Miller for general distribution, and the various state surveys for species. *Winter term, (a and b), at 8; spring term, (c and d), at 8; and fall term, (e), at 1.20, full credit.* Professor ROLFE, and Mr. HUBBARD.

Required: Chemistry 3b; Mineralogy 1.

2. INVESTIGATIONS AND THESIS.—For students who select a geological thesis guidance, and facilities will be offered for individual investigations in the field and laboratory. *Fall, winter, and spring terms, full credit.* Professor ROLFE.

Required: Geology 1.

3. ENGINEERING GEOLOGY (for engineers only).—This course treats of those parts of geology which are of practical benefit to an engineer. The course deals mainly with subjects connected with the origin, classification, and transformation of rocks; with the principles which govern the deposition and structure of rock masses; with the conditions under which the useful rocks and minerals occur, and the conditions which make them more or less valuable. The instruction is given by lectures and by demonstrations in the laboratory. *LeConte's Elements of Geology. Spring term, at 1.20; full credit.* Professor ROLFE and Mr. HUBBARD.

4. General Geology, Minor Course.—This course includes a selection of such geological facts and theories as should be known to every intelligent person, with such discussion of them as the time will permit. The subjects treated will be fully illustrated, and opportunity will be afforded for some study of rocks and fossils. *LeConte's Elements of Geology. Winter term, at 1.15, full credit.* Professor Rolfe and Mr. Hubbard.

Note.—Geology 1a and b may be taken as a minor instead of geology 4, by students who have had mineralogy 1; or geology 1a and c may be so taken by students who have had majors in botany and zoölogy.

COURSES FOR GRADUATES

101. Paleontology.—A critical and comparative study of the fossils found in the rocks of Illinois.

102. Economic Geology.—The effects which variations in the chemical composition and physical constitution of inorganic substances used in the arts have on the qualities of the manufactured product, and should have on methods of manufacture. A critical examination of the tests now employed in determining the qualities of building stones.

103. Illinois Geology.—Glacial geology in relation to water supply of drift-covered regions. Dynamic and stratigraphic geology of the Ozark uplift in Illinois.

GERMAN

1. Elementary Course.—Thomas's Practical German Grammar; Super's German Reader; Storm's Immensee, with Hatfield's Composition, based on Immensee; Heyse's L'Arrabiata, or other easy narrative prose. *Fall and winter terms, at 9. at 10, at 11, and at 2.20, full credit.* Mr. Rowell and Mr. Meyer.

2. Reading and Composition.—During the fall term narrative and descriptive or historical prose is translated and work in composition is based upon Jagemann's Prose and Syntax. In the winter and spring terms the works read are selected from the German classics. Exercises in reading at sight and in composition, based upon the texts translated, are required. *Fall, winter, and spring terms, at 8 and at 1.20, full credit.* Associate Professor Rhoades and Mr. Meyer.

Required: German 1 and 8, or two years of high school work.

3. Critical Study of Classical Authors.—Translation and collateral reading. In 1898-99 this course may be elected as 3b;

Study of Schiller's Life and Works; in 1899-1900, Study of Lessing's Works, designated as 3a. *Fall, winter, and spring terms, M., W., F., at 1:15, three-fifths credit.* Associate Professor RHOADES.

Required: German two, or three years of high school work.

4. STUDY OF GOETHE.—Translation and discussion of the works selected; lectures on Goethe's Life and Works. In 1898-99 this course may be elected as 4b; study of Faust and the Faust problem; in 1899-1900, study of Goethe's lyrics, prose writings, and dramas, especially those of his classical period, designated as 4a. *Fall, winter, and spring terms, M., W., F., at 2.10, three-fifths credit.* Associate Professor RHOADES.

Required: German 3.

4c. In connection with course 4 collateral reading and investigation may be taken. *Fall, winter, and spring terms, Tu., Th., at 2.10; two-fifths credit.* Professor RHOADES.

6. PROSE AND SCIENTIFIC READING.—Required course for students in the College of Science. The fall term is devoted to reading standard works in general prose, together with exercises in composition. During this term the work is not essentially different from that in course 2, with which it may be interchanged if necessary. In the winter term physico-mathematical reading is required. The class has constant drill in reading at sight. In the spring term three sections are formed, reading respectively in biological, chemical, and physical science. *Fall and winter terms, at 8, and spring term, at 8 and at 11, full credit.* Mr. ROWELL.

Required: German 1 and 8, or two years of high school work.

7. ENGINEERING COURSE.—For students in the College of Engineering. Translation of articles dealing with physics, or the history of architecture. *Spring term, at 9 and at 2.20, full credit.* Mr. ROWELL.

Required: German 1, or entrance requirement in German.

8. PROSE, NARRATIVE, AND MODERN DIALOGUE.—For students in the College of Literature and Arts, and in the College of Science. Bernhardt's Novelletten Bibliothek; Freytag's Journalisten, or other works of similar character. Harris's Prose Composition. *Spring term, at 9, at 11, and at 2.20, full credit.* Mr. MEYER.

Required: German 1.

9. HISTORY OF GERMAN LITERATURE.—Lectures and assigned collateral reading. *Fall and winter terms, Tu., Th., at 1.15, two-fifths credit.* Associate Professor RHOADES.

10. LECTURES ON LESSING OR SCHILLER.—Planned to supplement course 3, and to be taken in connection with it. This course may be elected as 10a or 10b, the author read in course 3 determining the designation. *Spring term, Tu., Th., at 1.15, two-fifths credit.* Associate Professor RHOADES.

GREEK

1. SELECTIONS FROM HERODOTUS, with readings from Thucydides for comparison of style and historic method. Studies in Ionic etymology. Greek Prose once a week, with particular reference to the syntax of the verb. *Fall term, at 11, full credit.* Professor MOSS.

2. ANDOCIDES DE MYSTERIIS, DEMOSTHENES ON THE CROWN. The development of oratory among the Greeks, by lectures and library references. *Winter term, at 11.05, full credit.* Professor MOSS.

Required: Greek 1.

3. DEMOSTHENES ON THE CROWN, AESCHINES AGAINST CTESIPHON. Continuation of winter term's work. *Spring term, at 11, full credit.* Professor MOSS.

Required: Greek 2.

4. XENOPHON'S MEMORABILIA.—Lectures upon the work and influence of Socrates as a public teacher, with collateral readings upon assigned topics. *Fall term, at 8, full credit.* Professor MOSS.

Required: Greek 3.

5. PLATO.—One entire dialogue and selections from others. Studies in the rhetoric and idiom of the author. Discussion of his philosophical views, so far as illustrated in the pieces read. *Winter term, at 8.20, full credit.* Professor MOSS.

Required: Greek 4.

6. SOPHOCLES' ELECTRA, EURIPIDES' IPHIGENIA IN TAURIS. History of the Greek drama. The literary structure and technics of the plays named. *Spring term, at 8, full credit.* Professor MOSS.

Required: Greek 5.

7. HOMER.—Two or three books of the Odyssey will be read by the class in common, and made the basis for some preliminary studies, when special readings in the text will be assigned to each student, and papers prepared by them upon suitable topics. Such papers will be read before the class and discussed. *Fall term, at 3.20, full credit.* Professor MOSS.

Required: Greek 6.

8. HOMER.—Continuation of course 7. *Winter term, at 3.05, full credit.* Professor MOSS.

Required: Greek 7.

9. OLD GREEK LIFE.—Course of semi-weekly lectures upon old Greek life, political, social, etc. For those who take the lectures and minimum reading, half credit; for others, full credit. *Spring term, at 3.20.* Professor MOSS.

COURSES FOR GRADUATES

101. Herodotus.

102. Plato.

HISTORY

1. MEDIAEVAL AND MODERN EUROPEAN HISTORY.—Elementary, introductory course. *Fall, winter, and spring terms, M., W., F., at 2.30, three-fifths credit.* Professor GREENE and Dr. HOWLAND.

2. HISTORICAL INTRODUCTION TO CONTEMPORARY POLITICS.—The political history of the nineteenth century. *Fall and winter terms, Tu., Th., at 2.20, two-fifths credit.* Professor GREENE.

3. AMERICAN HISTORY.—The origin and growth of the nation from the beginning of English colonization in America to the close of the Reconstruction period. *Fall, winter, and spring terms, at 8, one credit. Students may, however, enter the course at the beginning of the winter term, omitting the colonial era.* Professor GREENE.

Required: History 1 or 2.

4. ENGLISH CONSTITUTIONAL HISTORY.—Designed especially for those who are intending to take the course in Law. *Fall, winter, and spring terms, M., W., F., at 10, three-fifths credit.* Dr. HOWLAND.

Required: History 1.

5. THE HISTORY OF GREECE AND ROME.—This course is intended particularly to meet the needs of students who intend to teach the classics and ancient history in secondary schools. *Fall, winter, and spring terms, three-fifths credit.* Dr. HOWLAND. [Omitted in 1898-99.]

6. HISTORY OF ROME.—The aim of this course, which is intended to be introductory to History 1, will be to give a general survey of the ancient world before the appearance of the Germans, rather than to trace the economic and political history of the city. *Spring term, at 2.20, full credit.* Dr. HOWLAND.

7. MODERN EUROPEAN HISTORY.—Europe from the age of Louis XIV. to the present time. *Fall, winter, and spring terms,*

M., W., F., at 1.20, three-fifths credit. [Alternates with 12.] Professor GREENE.

Required: History 1.

8. SEMINARY IN AMERICAN HISTORY.—Training in the use of the sources. *Fall, winter, and spring terms, two-fifths credit. Arrange hours.* Professor GREENE. Course 8 is open to graduates and also to seniors of high standing who take or have taken history 3.

9. SEMINARY IN MEDIAEVAL HISTORY.—Topics to be arranged. Students who take this course will be expected to take history 10 also. *Fall, winter, and spring terms, two-fifths credit. Arrange hours.* Dr. HOWLAND.

10. EUROPEAN HISTORY FROM 800 TO 1300.—A study of the period most fitly termed "mediæval," and of its characteristic institutions. *Fall and winter terms, M., W., F., at 9, three-fifths credit.* Dr. HOWLAND.

Required: History 1.

11. EUROPE IN THE FOURTEENTH AND FIFTEENTH CENTURIES. —The transition from the middle ages to the modern world. *Spring term, M., W., F., at 9, three-fifths credit.* Dr. HOWLAND.

Required: History 1.

12. THE BEGINNING OF MODERN EUROPE.—The Protestant Reformation and the religious wars. The Puritan Revolution in England. The rise of the Bourbon monarchy in France. *Fall, winter, and spring terms, three-fifths credit.* Professor GREENE. [Omitted in 1898-99.]

COURSES FOR GRADUATES

101. Seminary in American History.

102. Seminary in Mediæval History. [See the announcement of courses in Law for the Seminary in Legal History.]

HORTICULTURE

1. INTRODUCTORY COURSE.—This course is intended to give a general idea of horticultural work, such as all students in the College of Agriculture should have, and at the same time to prepare those who wish it for more advanced work. It is prefaced by a discussion of some of the essentials and difficulties of fruit growing.

(a) ORCHARDING.—1st. Pomaceous fruits: Apple, pear, quince. 2d. Drupaceous or stone fruits: Plum, cherry, peach and nectarine, apricot.

Each fruit is studied with reference to the following: Botanical matter, history, importance and extent of cultivation, soil, locations, fertilizers propagation, planting pruning and training, spraying, harvesting, storing and marketing, varieties, insect enemies, diseases, and profits. The grape and persimmon will also be briefly treated under this heading. Lectures, required readings, and practical exercises. *Fall term, Tu., Th., at 11, two-fifths credit.* Mr. BLAIR.

(b) PLANT PROPAGATION.—Methods of securing and perpetuating desirable varieties by self- and cross-fertilization, or hybridization, and selection. Propagation of plants by seed, cuttings, layering, grafting, budding, etc. Lectures, required readings, and laboratory work. *Winter term, Tu., Th., at 11.05, two-fifths credit.* Mr. BLAIR.

(c) SMALL FRUITS.—The strawberry, raspberry, blackberry, dewberry, currant, gooseberry, cranberry, and juneberry.

Each fruit is studied with reference to the points enumerated under (a) above. The grape is also again touched upon under this topic. Lectures, reference readings, and practical work. *Spring term, Tu., Th., at 11, three-fifths credit.* Mr. BLAIR.

2. VITICULTURE.—A comprehensive study of grape culture covering fully the points enumerated above under course 1, (a). Lectures, readings, and field exercises. *Fall and spring terms, Tu., Th., at 10, two-fifths credit.* Mr. BLAIR.

3. PLANT HOUSES.—Greenhouses, their construction and management. Lectures and practical demonstrations. *Winter term, M., F., at 10.10, two-fifths credit.* Mr. BLAIR.

4. FORESTRY.—This course embraces a study of forest trees and their natural uses, their distribution, and their artificial production. The relations of forest and climate are studied, and the general topics of forestry legislation and economy are discussed. Lectures. *Fall term, Tu., Th., at 10, two-fifths credit.* Professor BURRILL.

5. LANDSCAPE GARDENING.—Ornamental and landscape gardening, with special reference to the beautifying of home surroundings. The subject is treated as a fine art, and will be illustrated. *Fall term, M., W., F., at 9, three-fifths credit.* Professor BURRILL and Mr. BLAIR.

6. ECONOMIC BOTANY.—See Botany 8 for description of this course (p. 173). *Winter term, at 10.10; full credit.* Professor BURRILL.

7. VEGETABLE GARDENING.—Kitchen and market gardening, embracing a study of the following: Asparagus, beans, beet, brus-

sells sprouts, cabbage, cauliflower, broccolli, celery, cress or pepper grass, cucumbers, egg plant, lettuce, mushroom, musk melon, onion, parsley, peas, pepper, pumpkin, radish, rhubarb, spinach, squash, sweet potato, tomato, and water melon; each studied with reference to the points enumerated under course 1, (a). Lectures, required readings, practical work. *Spring term, at 9, full credit.* Mr. BLAIR.

8. FLORICULTURE.—The study and management of conservatory and house plants. *Fall, winter, and spring terms, Tu., Th., at 1.20, two-fifths credit.* Mr. BLAIR.

9. PRACTICAL HORTICULTURE.—A course giving a practical training for those students intending to follow horticulture as a business. *Fall, winter, and spring terms, S., at 9, two-fifths credit.* (Six hours a week required.) Mr. BLAIR.

10. SPECIAL INVESTIGATIONS AND THESIS WORK.—For graduates and advanced students. *Fall, winter, and spring terms, two-fifths credit.* Professor BURRILL.

ITALIAN

1. GRAMMAR AND READING.—Grandgent's Italian Grammar, reading of modern authors; Dante's Divina Commedia, outlines of Italian literature. *Fall, winter, and spring terms, full credit. Arrange hours.* Assistant Professor FAIRFIELD.

LATIN

1. LIVY.—Selections from the XXI. and XXII. books. Latin composition based on the text. The main object of this course is to secure accuracy in pronunciation and facility in reading easy Latin. *Fall term, at 8, full credit.* Professor BARTON.

2. PLINY THE YOUNGER.—Selected Letters. The Life of a Roman gentleman under the early empire. Outlines of Roman Literature. *Winter term, at 8.20, full credit.* Professor BARTON.

Required: Latin 1.

3. TERENCE.—Phormio and Adelphi. Roman comedy, lectures. Hayley's introduction to the verse of Terence. Scenic antiquities. *Spring term, at 8, full credit.* Professor BARTON.

Required: Latin 2.

4. HORACE.—Odes. Roman lyric poetry. The art of Horace as a contribution to the world's best literature. *Fall term, at 1.20, full credit.* Professor BARTON. [Not given in 1898-99.]

Required: Latin 3.

This course will be given in alternate years with course 5.

[Not given in 1898-99.]

5. HORACE.—Satires and Epistles. Especial reference to the private life of the Romans in the time of Augustus. *Fall term, at 1.20, full credit.* Professor BARTON.

Required: Latin 3.

6. TACITUS.—Agricola and Germania. The Agricola will be considered both from the standpoint of biography and also as an introduction to the constructions and style of Tacitus. The Germania, in connection with Cæsar's account of the customs of the Germans. *Winter term, at 1.15, full credit.* Professor BARTON.

Required: Latin 3.

7. PLAUTUS.—The Captivi and Trinummus. Comedy as an exponent of social life. Themes. *Spring term, at 1.20, full credit.* Professor BARTON.

Required: Latin 3.

8. THE ROMAN HISTORIANS.—Readings from Cæsar, Sallust, Livy, Tacitus, and Suetonius. The aim of the course is partly grammatical and partly is devoted to a study of differences in style and method of treating historical themes. *Fall term, at 10, full credit.* Professor BARTON.

Required: Latin 3.

9. JUVENAL AND MARTIAL.—Roman Satire and Epigram. Society in the first century. Lectures and themes. *Winter term, at 10.10, full credit.* Professor BARTON.

Required: Latin 3.

10. TEACHER'S COURSE.—A study and discussion of the aims and essentials of preparatory Latin teaching, methods of presentation, and the condition of Latin study in the high schools. Students will do the work of a preparatory class and at intervals take charge of the recitation. *Spring term, at 10, full credit.* Professor BARTON.

COURSES FOR GRADUATES

101. CATULLUS.—Selected readings. The position of Catullus and Horace in Roman lyric poetry. The indebtedness of Horace and Vergil to Catullus.

102. THE ELEGAIC POETS.—Selections from Ovid, Propertius, and Tibullus.

103. VERGIL.—The Aeneid. Reading and interpretation.

LAW

1. Contracts.—Fall term, M., Tu., W., Th., at 11; winter term, M., Tu., Th., at 11.05; spring term, M., W., at 11. Professor Pickett.

2. Torts.—Fall term, M., W., F., at 9; winter term, Tu., Th., at 9.15; spring term, Tu., Th., F., at 9.

3. Real Property.—Fall term, Tu., Th., F., at 10; winter and spring terms, M., W., F., at 10. Professor Gardner.

4. Domestic Relations.—Winter term, W., F., at 9.15.

5. Criminal Law.—Spring term, Tu., Th., at 11. Professor Pickett.

6. Evidence.—Fall term, M., T., W., at 11; winter term, M., Tu., Th., at 11.05; spring term, Tu., Th., F., at 11. Professor Gardner.

7. Sales.—Fall and winter terms, W., F., at 9. Professor Pickett.

8. Real Property.—Fall term, Th., F., at 11. Professor Gardner.

9. Pleadings.—Fall term, M., T., Th., at 10.

10. Agency.—Winter term, M., Tu., Th., at 10.10.

11. Damages.—Winter term, W., F., at 10.10.

12. Bailments.—Spring term, at 10. Professor Pickett.

13. Guaranty and Suretyship.—Spring term, M., W., at 9.

14. Equity.—Fall and winter terms, M., Tu., Th., F., at 10. Professor Pickett.

15. Private Corporations.—Fall term, M., Tu., W., F., at 9. Professor Gardner.

16. Commercial Paper.—Fall term, W., Th., at 11; winter term, M., W., at 11.05.

17. Wills.—Winter term, Tu., Th., at 9.15; spring term, M., Tu., Th., at 9. Professor Gardner.

18. Partnership.—Spring term, M., W., F., at 11.

19. Constitutional Law.—Same as *Public Law and Administration 9*.

20. Equity Pleadings.—Spring term, F., at 9. Professor Pickett.

LIBRARY SCIENCE

1. Elementary Library Economy.—Cataloguing is taught according to Dewey's Library School Rules, and Cutter's Rules for a Dictionary Catalogue. After each lecture students are required to catalogue independently a number of books. The class is taught to modify the rules to suit different types of libraries. Lectures are given on forms of card catalogues and mechanical accessories. Library hand-writing is taught in connection with cataloguing.

The work of the order department is taught by lectures and practice. Instruction in the accession department is according to Dewey's Library School Rules. Lectures are given upon duplicates, exchanges, gifts, importing, copyright, and allied topics.

In the shelf department Dewey's Library School Rules is used and supplemented by lectures. The Dewey decimal classification is taught, as are also the principles of single and double entry loan systems in preparation for inspection visits. Lectures on binding are followed by visits to binderies. Instruction in mending books is also given. Visits of inspection to Chicago libraries are made in the spring term, when the students have become familiar with library methods. Each student is appointed to make a special study of some one department and report to the class at a general discussion which follows the visit. Problems are given in buying supplies, in organizing and reorganizing libraries, and in preparing printed finding lists. Single lectures are given on library associations, library schools, library commissions, traveling libraries, home libraries, library economy publications, government and service, library legislation, regulations for readers, library architecture, libraries and schools, and other general subjects, to acquaint students with current general library topics. *Fall and winter terms, at 9, one credit; spring term, at 8, one and one-fifth credits.* Professor Sharp and Miss Mann.

2. Elementary Reference.—Lectures are given on reference books considered in groups, such as indexes, dictionaries, encyclopædias, atlases, hand-books of history, hand-books of general information, quotations, statistics, etc. Reference lists are prepared for special classes and for literary societies, and the students have practical work in the reference department of the library. *Fall, winter, and spring terms, Tu., at 8, once in two weeks, two-fifths credit.* Miss Straight.

3. ELEMENTARY BIBLIOGRAPHY.—American, English, French, and German trade bibliography is taught by lectures and problems in the fall term. In the winter term special bibliographies and reading lists are made, based upon instruction in reference also. *Fall term, Tu., at 8, two-fifths credit; winter term, once in two weeks, Tu., at 8, three-fifths credit.* MISS STRAIGHT.

4. SELECTION OF BOOKS.—Study is based upon the Publishers' Weekly. Each student checks desired books each week, examines them if possible, and studies reviews in order to make a final choice of five or ten books each month. These books are carefully reviewed in class with regard to author, subject, edition, and series. Especially interesting publications, and current library topics are called to the attention of the students at this time. *Fall, winter, and spring terms, F., at 8, two years, one-fifth credit.* MISS STRAIGHT.

5. ELEMENTARY APPRENTICE WORK.—A laboratory for the mechanical preparation of books for the shelves is fitted up in the stack room, and here each student is given practical work each week. Each student acts as assistant to each member of the library staff in turn, thus learning many points which cannot be given in the class room. Each student has regular hours at the loan desk. Orders in outside work in cataloguing, organizing, bibliography, and writing are taken and given to the class for experience. *Fall and winter terms, at 10, two-fifths credit; spring term, at 10 and at 1.20, one and one-fifth credits.* Miss MANN.

Required: Library 1, 2, 3.

6. ADVANCED LIBRARY ECONOMIC.—In a comparative study of classification are discussed the systems of Dewey, Cutter, Edwards, Fletcher, Perkins, Smith, and Schwartz. A comparative study of cataloguing considers the rules of British Museum, Jewett, Library Association of the United Kingdom, Bodleian library, American library association, Wheatly, Perkins, Cutter, and Dewey. Students revise junior cataloguing as a review, and catalogue new books for the library. A comparative study is made of loan systems used in different types of libraries, with careful discussion of the principles of guarantee, age limit, fines, renewals, reserves, etc. The class forms a seminary for the discussion of questions affecting the founding and government of libraries, library legislation, library architecture, library administration, and current problems in public and college library work. *Fall, winter, and spring terms, M., Tu., W., at 10, three-fifths credit.* Professor SHARP and Miss MANN.

Required: Library, 5.

7. Advanced Bibliography.—Lectures on subject bibliography are given by professors at the University. Students are given many practical problems. The greater part of the time is devoted to work on the original bibliography which is required of each student for graduation. *Fall and winter terms, once a week, one credit; spring term, one-fifth credit. Arrange hours.* Professor Sharp.

Required: Library, 3.

8. History of Libraries.—Libraries are studied by types and by countries. Special attention is given to libraries in the United States, their reports being used as text-books. *Fall and spring terms, Th., at 11, two-fifths credit.* Miss Straight.

9. Advanced Reference.—The fall term is devoted to a study of public documents; the winter term takes up transactions of societies, advanced reference books, and indexing. *Fall and winter terms, Th., at 8, two-fifths credit.* Professor Sharp and Miss Straight.

Required: Library 1, 2, 3.

10. Book-Making.—Lectures on the history of printing, printers' marks, book-plates, and the history and art of binding. *Winter term, Th., at 10.10, two-fifths credit.* Professor Sharp.

11. Advanced Apprentice Work.—Students are allowed a certain time each day for practical library work of an advanced grade, and gain experience in every department of the library. *Fall, winter, and spring terms, M., Tu., W., Th., at 8; F., at 10, three-fifths credit.* Miss Mann.

Required: Library, 5.

12. Thesis.—Each student is required to present a thesis for graduation. This must be on some library topic, and must represent original research. *Fall and winter terms, one-fifth credit; spring term, one and one-fifth credits. Arrange hours.* Professor Sharp.

Required: Library 1-11.

13. General Reference.—This course is offered to all students of the University who wish to become familiar with the ordinary reference books. It will comprise twelve lectures on the catalogue, classification, the reference room, the reading room, and groups of books, such as indexes, dictionaries, encyclopædias, atlases, handbooks of general information, handbooks of history, statistics, quotations, etc. *Fall term, one-fifth credit.* The hour will be arranged at convenience of instructor and students. Professor Sharp.

MATHEMATICS

1. ADVANCED ALGEBRA.—For students in courses requiring spherical trigonometry. This course presupposes a thorough knowledge of elementary algebra through simultaneous quadratics and proportion. Students, who for any reason have not had this elementary work recently, would find it to their advantage to review it thoroughly before commencing this course. The work will cover the following topics: Progressions, indeterminate equations, binomial theorem for fractional and negative exponents, undetermined coefficients, decompositions of fractions, theory of limits, convergency and divergency of series, reversion of series, summation of series, logarithms, continued fractions, permutations and combinations, probability, and the loci of equations. *Winter term, at 9.15 and at 11.05, full credit. Bowser's College Algebra.* Mr. BRENKE.

2. ADVANCED ALGEBRA.—For students in courses not requiring spherical trigonometry, to be taken with course 4. This course will cover all the work given in course 1, and in addition will include a short introduction to the general theory of equations, with applications to the solution of numerical equations. *Winter term, at 8, at 9, at 10, at 11, and at 1.20, two-fifths credit; winter term, at 8, at 9, at 10, at 11, and at 1.20, full credit. Bowser's College Algebra.* Mr. BURNHAM.

3. PLANE AND SPHERICAL TRIGONOMETRY.—This course covers the same ground in plane trigonometry as course 4. In addition to the work outlined there, about two-fifths of the term will be given to developing the general principles and applications of spherical trigonometry. It is intended that this course shall be followed by course 1 in advanced algebra. *Fall term, at 9 and at 11, full credit. Bowser's Trigonometry.* Mr. BRENKE.

Required: Math. 19.

4. PLANE TRIGONOMETRY.—The following topics will be taken up, viz.: Measurement of angles, trigonometric functions and their fundamental relations, functions of the sum and the difference of two angles, functions of twice an angle and of half an angle, the construction and use of logarithmic tables, solution of trigonometric equations, the relations between the sides of a triangle and the functions of its angles, the solution of triangles, Demoirve's theorem and trigonometric series. This course taken with that portion of course 2 in advanced algebra given in the fall term makes a full

credit. *Fall term, at 8, at 9, at 10, at 11, and at 1.20, three-fifths credit. Bowser's Trigonometry.* Mr. BURNHAM.

5. CONIC SECTIONS (Geometrical Method).—Definitions and general properties of the ellipse, hyperbola, and parabola, curvature of the conic sections; elements of analytical geometry. Properties and relations of the point and right line in a plane, and of the conic sections. *Cockshott & Walters's Geometrical Conics. Spring term, full credit.* Mr. BRENKE.

Required: Math. 1, 3.

6. ANALYTICAL GEOMETRY.—The aim is to acquaint the student with analytical methods of investigation and to familiarize him with some of the most recent developments in synthetic geometry; to make him more skillful in the use of algebraic processes, especially as a means of demonstrating geometric properties of loci. Subjects considered are the elementary theory of the point and right line in a plane; use of abbreviated notation; elementary theory of the conic sections, their equations and properties developed analytically; poles and polars; synthetic geometry of the circle, and the discussion of the general equation of the second degree. *Wood's Coordinate Geometry. Spring term, at 8, at 10, and at 1.20, full credit.* Mr. BURNHAM.

Required: Math. 2, 4.

7. DIFFERENTIAL CALCULUS.—Variables and functions; limits and infinitesimals; differentials and derivatives; differentiation of explicit functions, implicit functions, and functions of several variables; derivatives of higher orders; successive derivatives, developments in series; maxima and minima of functions; indeterminate forms; plane curves, tangents, and normals; asymptotes, singular points, and curve tracing; theory of envelopes, of curvature, of evolutes, and of involutes. *Byerly's Differential Calculus. Fall term, at 8 and at 9, full credit.* Professor SHATTUCK.

Required: Math. 6.

8. ADVANCED ANALYTICAL GEOMETRY.—Position and direction in space; direction and angles; projections and lines, direction cosines; transformation of coördinates; the general and normal equations of the plane; also in terms of the intercepts; the plane satisfying given conditions; relations of planes to one another; perpendicular distance to a plane; bisectors of dihedral angles; symmetrical equations of a straight line; condition that a line shall be parallel to a plane; equation of the common perpendicular to two given lines; condition of intersection; a quadric surface; conjugate axes and

planes; classes of quadrics; tangent and polar lines, and planes to a quadric; surfaces derived from generating curves; the equations of the helix; the conoid. *Wood's Coördinate Geometry. Winter term, at 8.20 and at 9.15, full credit.* Professor SHATTUCK.

Required: Math. 7.

9. INTEGRAL CALCULUS.—Elementary forms of integration; integrals immediately reducible to the elementary forms; integration by rational transformations; integration of irrational algebraic differentials; integration of transcendent functions; definite integrals; successive integration; differentiation under the sign of integration; integration by means of differentiating known integrals; double integrals; triple and multiple integrals; product of two definite integrals.

Rectification and quadrature; the parabola, the ellipse, the cycloid, the Archimedean spiral, the logarithmic spiral, the limniscate, the cycloid, quadrature of surfaces of revolution and of surfaces in general; cubature of volumes; the sphere, the pyramid, the ellipsoid, any solid of revolution, and of volumes in general. *Byerly's Integral Calculus. Spring term, at 8 and at 9, full credit.* Professor SHATTUCK.

Required: Math. 8.

10. THEORY OF EQUATIONS.—The development of the general properties of equations; relations of the roots and the coefficients of an equation, with applications to symmetric functions; transformation of equations; solution of reciprocal and binomial equations; algebraic solution of cubics and biquadratics; properties of derived functions; the limits and separation of the roots of equations; the solution of numerical equations of the nth degree. *Burnside and Panton's Theory of Equations. Fall term, at 8, full credit.* Associate Professor TOWNSEND.

Required: Math. 2, 4.

11. THEORY OF DETERMINANTS.—The origin and notation of determinants, properties of determinants, determinant minors, multiplication of determinants, determinants of compound systems, determinants of special forms—Jacobians, Hessians, Wronskians—with applications to algebra, including linear transformations, and to analytic geometry. *Hanus's Theory of Determinants,* supplemented by lectures. *Winter term, at 9.15, full credit.* Associate Professor TOWNSEND.

Required: Math. 7, 10.

12. THEORY OF INVARIANTS.—The course will cover the general development of the theory of invariants, both from the geometric

and from the algebraic side. Applications of invariants will be made to systems of conics and to higher plane curves. Lectures with collateral reading. *Fall term, M., W., F., at 9, three-fifths credit.* Associate Professor TOWNSEND.

Required: Math. 11.

13. THEORY OF FUNCTIONS.—By way of introduction, considerable attention will be given to the geometric representation of the complex variable, including Argand's diagram, conformal representation, and harmonic ratios, and bilinear transformation. This will be followed by the development of the theory of infinite series, algebraic and transcendental functions, integration of uniform functions, Riemann's surfaces, introduction to elliptic functions, etc. *Durege's Theory of Functions and Collateral Reading. Winter and spring terms, M., W., F., at 10, three-fifths credit.* Associate Professor TOWNSEND. [Not given in 1898-99.]

Required: Math. 7, 8, 9, 10.

14. METHOD OF LEAST SQUARES.—The object of this course is to present the fundamental principles of the subject, in a manner so plain as to render them intelligible and useful to students of astronomy and engineering. The following subjects will be studied: Law of probability and error, adjustment of observations, precision of observations, independent and conditioned observations, etc. *Merriman's Least Squares. Fall term, Tu., Th., at 1.20, two-fifths credit.* Associate Professor MYERS.

Required: Mathematics 9.

15. SEMINARY AND THESIS.—*Fall term, Tu., Th., at 9; winter and spring terms, Tu., Th., at 10, two-fifths credit.* Associate Professor TOWNSEND.

16. DIFFERENTIAL EQUATIONS.—This subject is designed for students in the courses of engineering and of mathematics and astronomy. It will embrace the following topics: General linear equations with constant coefficients, special forms of differential equations of higher order, integration of series, etc. *Johnson's Differential Equations. Winter term, Tu., Th., at 11.05, three-fifths credit. Spring term, Tu., Th., at 1.20, two-fifths credit.* Associate Professor MYERS.

Required: Math. 9.

17. ANALYTICAL GEOMETRY OF SPACE.—A general review will be given of the position of the plane and the right line in space and the more general properties of surfaces of the second degree. To this will be added the classification and special properties of

quadrics, and a brief introduction to the theory of surfaces in general. *Chas. Smith's Solid Geometry. Spring term, at 8, full credit.* Associate Professor TOWNSEND.

Required: Math 9, 11.

18. HIGHER PLANE CURVES.—This course is designed to cover the general theory of algebraic curves, together with the application of the theory of invariants to higher plane curves. Special study will be made of curves of the third and fourth order. *Lectures with collateral reading. Winter term, M., W., F., at 10, three-fifths credit.* Associate Professor TOWNSEND.

Required: Math. 12.

19. SOLID AND SPHERICAL GEOMETRY.—This is a course prescribed for the students in the College of Literature and Arts. *Spring term, at 1.20, one credit.* Mr. BRENKE.

20. CALCULUS OF VARIATIONS.—This course has for its aim merely to acquaint the student with those elements of the science which are most needed in the study of the higher subjects of mathematical astronomy and physics. *Carll's Calculus of Variations. Fall term, M., W., F., at 2.20, three-fifths credit.* Associate Professor MYERS.

Required: Math. 11, 16. [Not given in 1898-99.]

21. SPHERICAL HARMONICS.—In this course, a thorough study is made of so much of this subject as is of interest to an astronomer. It is introduced by a short course of lectures and study of certain trigonometric series. Fourrier's Theorem for developing any function of a variable in a series proceeding in sines and cosines of multiples of the variable is derived and the limitations of its validity investigated. This is followed by the study of Lagrange's, Laplace's and Lame's functions and their applications to astronomical and physical problems. *Byerley*'s *Fourrier's Series and Spherical Harmonics. Winter term, M., W., F., at 2.10, three-fifths credit.* Associate Professor MYERS.

Required: Math. 11, 14, 16. [Not given in 1898-99.]

22. POTENTIAL FUNCTION.—The potential function is defined and its properties derived and discussed. The potential of various bodies; such as of a wire, a spherical shell, a sphere, ellipsoid of revolution, etc., is computed. Poisson's and Laplace's Equations are derived and discussed. Green's Propositions with kindred and similar subjects are handled. *Pierce's Newtonian Potential Function. Spring term, M., W., F., at 2.20, three-fifths credit.* Associate Professor MYERS.

Required: Math. 21; Astronomy 6. [Not given in 1898-99.]

23. MODERN GEOMETRY.—This course will include in general a consideration of homogeneous co-ordinates duality, descriptive and metrical properties of curves, anharmonic ratios, homography, involution, projection theory of correspondence, etc. *Scott's Modern Analytic Geometry. Fall term, M., W., F., at 9, three-fifths credit.* Associate Professor TOWNSEND.

Required: Math. 8, 11. [Not given in 1898-99.]

24. ALGEBRAIC SURFACES.—In this course will be considered the application of homogeneous co-ordinates and the theory of invariants to geometry of three dimensions, and also the general theory of surfaces, together with the special properties of surfaces of the third and fourth order. *Lectures with collateral reading. Spring term, M., W., F., at 10, three-fifths credit.* Associate Professor TOWNSEND.

Required: Math. 17, 18.

COURSES FOR GRADUATES

Courses 10 to 24, inclusive, are open to graduate students.

MECHANICAL ENGINEERING

1. SHOP PRACTICE.—In the shops the work, as far as possible, is carried along the same lines as are practiced in our leading commercial shops. The exercises are, in general, chosen from parts of machines under construction, and carefully graded to the skill of the student. Beginning with the care and use of the tools with which he is to work, the student is carried through the various operations of machine-shop practice. Following is an outline of the work, that of the several terms being subject to transposition.

First Term, Wood Shop.—Primary exercises relating to the use and care of tools, and the construction of a series of exercises in joint work and turning, preparatory to pattern making.

Second Term, Wood Shop.—The work of this term is devoted largely to the making of patterns and core boxes, particular attention being given to the principles of molding.

Third Term, Foundry.—The student here receives instruction in the management of the cupola and molding, including green and dry sand core making. *Fall, winter, and spring terms, at 8, at 10, and at 1.20, full credit.* Mr. CURTISS and Mr. WILSON.

2. SHOP PRACTICE.—First Term, Forge Shop.—Instruction is given in the forging and welding of iron and steel, special attention

being given to the forging and tempering of lathe and planer tools, annealing, and case hardening.

Second Term, Machine Shop.—During this term the student receives instruction in chipping, filing, and elementary lathe and planer work.

Third Term, Machine Shop.—Lathe, planer, drill, shaper, or bench work. *Fall, winter, and spring terms, Lecture, M., Th., at 1.20; Shop, Tu., W., F., at 1.20, M., Th., at 2.20, half credit.* Mr. Clark and Mr. Jones.

3. Power Measurements.—This is the beginning of the work in the mechanical engineering laboratory, and is intended for students taking the mechanical engineering course. A study is made of the use and construction of the steam engine indicator. The measurement of power developed by the steam engine under different conditions is made a prominent part of the work. The method of applying friction brakes and measuring transmitted power is also taken up. *Fall, winter, and spring terms, at 1.20, arrange hours; S., at 8, half credit.* Mr. McKee.

Required: Mechanical Engineering 1, 2; Math. 9.

4. Elements of Machine Design.—The basis of this work is found in *Klein's Elements of Machine Design.* A series of plates 26x40 inches is constructed, covering a wide range of machine parts. There are 334 formulas, empirical and rational, the use and derivation of which are explained. By means of a large number of practical examples, sufficient drill is obtained in using them to enable the student to make the calculations required when designing various parts of machines. Theoretical and practical problems relating to gearing are taken up and worked out in detail. *Kent's Mechanical Engineers' Pocket-book; Low and Bevis's Machine Design; also Unwin's Machine Design. Fall, winter, and spring terms, at 1.20, half credit.* Mr. Kavanaugh.

Required: General Engineering Drawing 2, 3, 4.

5. Mechanism.—A study of nature and equivalence of mechanisms. Determination of centrodes. Graphical diagrams of the paths, speeds, and accelerations of important points of familiar mechanisms. Laying out of cams. Analysis of difficult mechanisms. Determination of velocity ratios. Particular attention is paid to problems relating to motions of gearing, steam-engine mechanisms, parallel motions of indicators, governors, link motions, valve gears, and indicator riggings. *Fall term, at 9, full credit.* Mr. Kavanaugh.

Required: Math. 2, 4, 6; Mechanical Engineering 1, 2, 4.

7. THERMODYNAMICS.—The fundamental principles underlying the transformation of heat into work, more especially as exemplified in the steam engine, are carefully studied. Considerable attention is paid to the solution of numerous examples, such as will arise in steam, air, or gas engineering. Drill is given in the rapid and accurate use of standard steam tables. *Fall term, at 8, full credit.* Professor BRECKENRIDGE.

Required: Math. 9; Theoretical and Applied Mechanics 1; Physics 1, 3.

8. MECHANICS OF MACHINERY.—This is a study of the theoretical principles involved in the construction of such machinery as comes under the head of hoisting apparatus, pumping engines, air compressors, fans, blowers, machinery for transmitting power, locomotives, pile drivers. *Winter term, Tu., W., Th., at 8.20, three-fifths credit, and spring term, at 8, full credit.* Professor BRECKENRIDGE.

Required: Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 5, 7, 14, 15.

9. ADVANCED DESIGNING.—This work follows the design of a high-speed steam engine, and comes under two heads.

Advanced Design: Under this head the work begins with simple machines and extends to more difficult designs as the student progresses. The design of attachments to existing machines, or the complete design of some machine that can be built in the shops, is often a part of this work. Such designs as hoists, pumps, drills, lathes, etc., are undertaken.

Original Design: In this work the student's previous training in designing is combined with his inventive ability, and often valuable and ingenious work is done. The machines are to be designed for accomplishing a certain prescribed work. Often but a single piece is handed the student, and a machine is required which will produce a given number of these pieces per hour.

A large amount of study of existing machines is required. The student is taught to consult the standard works on designing, such as *Unwin, Reuleaux, Klein, Marks, Richards,* and to use such books as *Kent, Nystrom, Haswell, Taschenbuch der Hütte,* etc. *Winter term, Tu., W., Th., at 9.15; spring term, Tu., W., Th., at 1.20, and F., at 9, full credit.* Assistant Professor VANDERVOORT and Professor BRECKENRIDGE.

Required: Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 1 to 8, and 14.

10. ESTIMATES, SPECIFICATIONS, AND SUPERINTENDENCE.—Calculations and estimates are made as to the cost of machinery, power plants, boilers, chimneys, systems of piping, engines and their foundations, different methods of power transmission.

Also forms of contracts and specifications are studied. *Spring term, M., Tu., W., Th., at 9, full credit.* Professor BRECKENRIDGE.

Required: Theoretical and Applied Mechanics 1, 2, 3; Mechanical Engineering 1 to 6, 9, 12.

12. ADVANCED MECHANICAL ENGINEERING LABORATORY.—This work is a continuation of the work begun in the junior year. Experiments are made with engines, pumps, motors, injectors, and boilers to determine under what conditions they may be expected to give a maximum efficiency. Tests of plants in the vicinity are made, of which carefully prepared reports are always required. Through the kindness of Mr. W. Renshaw, Superintendent of Machinery of the Illinois Central Railroad, opportunites will be afforded to do practical work in locomotive testing, and considerable apparatus has been constructed for this important work. Advanced constructive work in the shops is assigned to groups of students, in order to impress upon them the intimate relation existing between the designing room and the shop. *Carpenter's Experimental Engineering. Fall term, Tu., Th., at 9; winter term, F., at 8.20, and at 1.15, full credit.* Professor BRECKENRIDGE, Assistant Professor VANDERVOORT, and Mr. MCKEE.

Required: Theoretical and Applied mechanics 1, 2, 3; Mechanical Engineering 1 to 7, 14, 15.

13. MECHANICAL ENGINEERING LABORATORY.—This is a laboratory course in which the student is taught to apply the indicator to different engines and to make the usual calculations of horse power and steam consumption as given by the diagrams. Correct forms of reducing motions are explained. How to read indicator diagrams and valve setting is also taught. *Indicator Practice and Steam Engine Economy—F. F. Hemenway. Spring term, S., at 8, half credit.* Mr. MCKEE.

Required: Mechanical Engineering 1, 2; Math. 7, 8, 9.

14. HIGH SPEED STEAM ENGINE DESIGN.—Under this head the steam engine is carefully studied. Each part of a complete engine is designed, and detailed drawings made and traced, so that each member of the class may have a complete set of blue prints. *Klein's High Speed Steam Engine. Fall term, M., W., F., at 9, three-fifths credit.* Assistant Professor VANDERVOORT.

Required: Theoretical and Applied Mechanics 1, 2, Mechanical Engineering 1 to 7, 16, 17.

15. VALVE GEARS.—Recitations and drawing room work. The application of graphical diagrams as an aid in the study and design of valves for steam distribution in the engine cylinder is carefully brought out. Determination of the dimensions of steam passages, single valve gears, double valve gears, equalization of steam distribution, application of diagrams to existing types of engines. *Klein's High Speed Steam Engine. Fall term, W., F., at 1.20, two-fifths credit.* Assistant Professor VANDERVOORT.

Required: Mechanical Engineering 1 to 7, 16, 17; Theoretical and Applied Mechanics 1, 2.

16. STEAM ENGINES.—A study of the details of steam engines. Elementary principles of transformation of heat into work. Laws of expansion of steam. The mechanics of the steam engine. Valves and valve gears. The indicator diagram, condensers, steam jackets, super-heaters, and compound engines. *The Steam Engine, Holmes. Winter term, M., W., F., at 8.20, three-fifths credit.* Assistant Professor VANDERVOORT.

Required: Theoretical and Applied Mechanics 1; Physics 1, 3.

17. STEAM BOILERS.—Materials used in the construction of boilers. Proportions and strength of riveted joints. Methods of setting boilers for maximum efficiency. Incrustation, explosions, combustion, safety appliances, feed apparatus, boiler trials. *A Treatise on Steam Boilers, Wilson-Flather. Winter term, Tu., Th., at 8.20, two-fifths credit.* MR. SWENEY.

Required: Mechanical Engineering 1; Physics 1, 3; Mathematics 2, 4, 6.

18. GRAPHICAL STATICS OF MECHANISM.—Graphical determination of the forces acting at different points in machines used for hoisting, crushing, punching, and transmitting motion, taking into account the resistances offered to motion by frictional resistances. Effort of sliding, rolling, and journal friction, chain friction, tooth friction, stiffness of ropes and belts. Graphical determination of the efficiency for the forward and reverse motion. *Graphical Statics of Mechanism, Herrmann-Smith. Winter term, M., at 8.20, two-fifths credit.* MR. KAVANAUGH.

Required: Theoretical and Applied Mechanics 1, 2.

19. SEMINARY.—Work supplementary to other studies of the senior year. Presentation of papers on assigned subjects. Contributed papers on current topics. Discussion and criticisms on

new inventions. *Fall, winter, and spring terms, M., at 1.20, one-fifth credit.* Professor BRECKENRIDGE.

20. SHOP PRACTICE FOR SPECIAL STUDENTS.—This course is open to those entering as special students, as defined elsewhere under "Admission." The work will be arranged after consultation. The work done does not count for a credit for graduation in any of the technical courses. *Fall, winter, and spring terms.* Assistant Professor VANDERVOORT.

21. FORGE SHOP PRACTICE.—This course is designed for students taking the winter course in Agriculture. The work covers instruction in forging, such as will be of use to the practical farmer. *Winter term.* Mr. JONES.

COURSES FOR GRADUATES

Primary

101. Advanced Machine Design, 1, 2, or 3 credits.
102. Graphics and Kinematics, 1 credit.
103. Mill Engineering, 1 credit.
104. Steam Engineering, 1, 2, or 3 credits.
105. Experimental Engineering, 1, 2, or 3 credits.
106. Thermodynamics, 1 credit.
107. Pneumatics, 1 credit.
108. Hydraulic Machinery, 1 credit.
109. Mechanical Technology, 1 credit.
110. Translation of Technical Engineering Work, 1, 2 or 3 credits.

Secondary

111. Any primary offered in the College of Engineering, 1 credit. Primary subjects may be taken as secondary in any course for the master's degree in the College of Engineering.

112. Indexing and Classification of Engineering Literature, 1 credit.

MECHANICS, THEORETICAL AND APPLIED

1. ANALYTICAL MECHANICS.—The mechanics of engineering, rather than that of astronomy and physics, is here considered. In addition to fixing the fundamental concepts and demonstrating the general principles of equilibrium and motion, application of principles and methods is made to numerous and varied engineering problems in such a way that the student must discriminate in the use of data and in the statement of conditions. As mathematical processes and forms express most readily and quickly the rules and

methods for the solution of such problems, this training is important. This subject requires a thorough working knowledge of the mathematics preceding it in the course. The methods of the calculus are used whenever preferable.

Outline of the subject: Nature and measure of force; composition and resolution of forces; moments; conditions of equilibrium; resultant of systems of forces; center of gravity; moment of inertia; rectilinear and curvilinear motion, and the relation between such motion and the constraining and accelerating forces; dynamics of a rigid body; momentum and impact; work, energy, and power; mechanical advantage. *Bowser's Analytical Mechanics. Fall term, at 8, and at 9, full credit.* Professor TALBOT.

Required: Math 9.

2. RESISTANCE OF MATERIALS.—In the treatment of this subject it is the aim to give the student a thorough training in the elementary principles of the mechanics of materials, to follow with such experiments and investigations in the testing laboratory as tend to verify the experimental laws, and to add such problems in ordinary engineering practice as will train the student in the use of his knowledge. Attention is also given to the quality and requirements for structural materials.

Outline of the subject: Elasticity of materials; stresses and strains; experimental laws; working strength for different materials; resistance of pipes and riveted joints; bending and resisting moment, shear, and elastic curve of cantilever, simple, restrained, and continuous beams; column formulas; torsion and shafts; maximum internal stresses in beams; fatigue of metals; working strength for repeated stresses; resilience; reliability of the common theory of flexure, as shown by actual experiment; design and strength of rolled and built beams and columns; specifications for materials and methods of testing. *Merriman's Mechanics of Materials. Winter term, at 8.20, and at 9.15, full credit.* Professor TALBOT.

Required: Math. 9; Theoretical and Applied Mechanics 1

3. HYDRAULICS.—In hydraulics the instruction is by text-book and laboratory work. The laws of the pressure and flow of water and its utilization as motive power are considered. Experimental work in the hydraulic laboratory gives training in the observation and measurement of pressure, velocity, and flow, and in the determination of experimental coefficients.

The subject covers the following: Weight and pressure of water; head; center of pressure; velocity and discharge through

orifices, weirs, tubes, nozzles, pipes, conduits, canals, and rivers; measurement of pressure, velocity, and discharge; meters and measurements; motors, turbines, and water wheels; water power and transmission of power. *Merriman's Hydraulics. Spring term, at 8 and at 9, full credit.* Professor TALBOT.

Required: Math. 9; Theoretical and Applied Mechanics 2.

4. APPLIED MECHANICS.—To be taken instead of Analytical Mechanics. The course of study and topics studied will be nearly identical. *Wright's Mechanics. Fall term, at 1.20, full credit.* Assistant Professor McLANE.

Required: Mathematics 6.

5. STRENGTH OF MATERIALS.—To be taken instead of Resistance of Materials. The course of study will be nearly the same, though somewhat simplified. *Merriman's Mechanics of Materials. Winter term, at 1.20, full credit.* Assistant Professor McLANE.

Required: Mathematics 6; Theoretical and Applied Mechanics 4.

COURSES FOR GRADUATES

101. Analytical Mechanics.
102. Resistance of Materials.
103. Hydraulics and Hydraulic Engineering.
104. Laboratory of Applied Mechanics.

MILITARY SCIENCE

1. DRILL REGULATIONS.—For all male students. First term: school of soldier; bayonet exercise; second term: school of company, close and extended order. *Fall and winter terms, one-fourth credit.* Professor BRUSH.

2. PRACTICAL INSTRUCTION IN SCHOOL OF SOLDIER.—Company and battalion in close and extended order; school of the cannoneer and of the battery dismounted; target practice. Freshmen and sophomore years; *six terms, counts one and one-half credits.* Professor BRUSH.

3. RECITATIONS AND PRACTICE FOR OFFICERS AND NON-COMMISSIONED OFFICERS.—*Sophomore year:* School of the battalion, close and extended order; ceremonies; review and inspection; military signaling; guard, outpost, and picket duty. *Junior year:* military administration; reports and returns; theory of firearms and target practice; organization of armies; field fortifications; art of war. *Seven terms, recitations one to two hours a week; drill two hours a week.* Professor BRUSH. This course is obligatory upon officers and non-commissioned officers, and open to others.

MINERALOGY*

1. ELEMENTS OF MINERALOGY.—The first term's work is a general introduction to the subject. Instruction includes lectures and laboratory practice. In the lectures, which occur on specified days (2 or 3 each week), such subjects as follow are discussed: genesis of minerals; conditions favoring their deposition; origin of the massive and crystalline forms; relationships of minerals and their classification; the physical properties of minerals, as color, luster, hardness, gravity, streak, etc., with the conditions which may cause these properties to vary; elements of crystallography.

In the laboratory the student is first made acquainted with the simplest trustworthy methods for proving the presence or absence of the acids and bases. He is then required to determine a large number of species by their physical and chemical properties only. *Fall term, at 8, full credit.* Professor ROLFE and Mr. HUBBARD.

Required: Chemistry 1.

2. ADVANCED MINERALOGY.—Crystallographic Mineralogy. During the second term a careful study of the forms of crystals is made, including the measurement of angles and determination of complex forms. The student is also required to identify many species of minerals by their crystalline forms, and to verify his conclusions by the methods in use during the preceding term.

Optical Mineralogy. The work of the third term will be devoted to the microscopic determination of rock forming minerals; to methods for separating the minerals constituents of fine-grained rocks, etc. *Winter and spring terms, at 10, full credit.* Professor ROLFE and Mr. HUBBARD.

Required: Mineralogy 1.

MUNICIPAL AND SANITARY ENGINEERING

1. ROAD ENGINEERING.—The value and importance of road improvement in country highways and the best means of securing it are considered, together with the principles and details of construction of earth, gravel, and macadam roads. In city streets, the methods of construction, cost, durability, and desirability of the various kinds of pavement, and the questions of grades, cross-sections, methods of assessment of cost, and methods of maintenance and cleaning are treated. *Lectures and reading. Winter term, at 10.10, with Civil Engineering 4, half credit.* Assistant Professor PENCE.

*See also under geology, and paleontology.

Required: Math. 4; General Engineering Drawing 1, 2; Civil Engineering, 1, 2, 3, 4.

2. WATER SUPPLY ENGINEERING.—This subject is intended to cover the principal features of the construction of water works, including the tests and standards of purity of potable water; the choice of source of supply; the designing of the distribution system, pumps and pumping machinery, reservoirs, and stand-pipes. *Lectures; Fanning's Water Supply Engineering. Fall term, at 10, and M., at 1.20, full credit.* Professor TALBOT.

Required: Theoretical and Applied Mechanics 1, 3; Chemistry 1; Mechanical Engineering 16.

3. SEWERAGE.—The design and methods of construction of sewerage systems of cities, including the following: Sanitary necessity of sewerage: water carriage systems, both separate and combined; surveys and general plans; hydraulics of sewers; relation of rainfall to storm water flow, and determination of size and capacity of sewers; house sewage and its removal; form, size, design, and construction of sewers and sewer appurtenances; modern methods of sewage disposal; estimates and specifications. *Lectures; Staley and Pierson's Separate System of Sewerage. Winter term, at 1.15, and M., at 2.10, full credit.* Professor TALBOT.

Required: Theoretical and Applied Mechanics 1, 3; Chemistry 1.

5a. BACTERIOLOGY.—For students in Municipal Engineering. This course includes the identification and classification of bacteria, and of allied organisms, their relations to health and to disease, the methods of separation and cultivation, and the methods of air and water analysis. The laboratory is furnished with sterilizers, culture ovens, microscopes, etc., and students have abundant opportunity to do practical work. *Winter term, at 1.15, first of term, two-fifths credit.* Professor BURRILL.

6. WATER PURIFICATION, SEWAGE DISPOSAL, AND GENERAL SANITATION.—This work includes the consideration of impurities in water supplies and the study of the methods and processes of their removal; the modern methods of sewage disposal by filtration, chemical precipitation, irrigation, etc., with a study of representative purification plants; garbage collection and disposal; sanitary restrictions and regulations and general sanitation. Lectures and seminary work. *Spring term, at 10, full credit.* Professor TALBOT.

Required: Municipal and Sanitary Engineering 2, 3, 5a; Chemistry 1, 3a.

COURSES FOR GRADUATES

Water Supply Engineering

101. Tanks, Stand Pipes, and Reservoirs.

102. Sources and Requirements of Water Supply for a City and Removal of Impurities.

103. Water Works Management and Economics.

104. Pumps and Pumping.

105. General Water Works Construction.

106. Biological and Chemical Examination of Potable Water.

107. Description of Water Supply Systems.

Sewerage

111. Sewage Purification.

112. Sewage Disposal Works.

113. General Sewerage Design and Construction.

114. City Sanitation.

115. Description of Sewerage Systems.

Road Engineering

118. Economic Aspect of Good Roads and Pavements.

119. Construction of Roads and Pavements.

Miscellaneous Subjects

121. Critical Description of Engineering Construction.

122. Translation of Technical Engineering Work from French or German.

123. Any Primary in Civil Engineering.

124. Any Primary in Theoretical and Applied Mechanics.

125. Any Primary in Mathematics, Mechanical Engineering, or Electrical Engineering—Secondary.

126. Indexing of Municipal and Sanitary Engineering Literature in Engineering Periodicals.

MUSIC

Course 1 will be counted for credit towards the regular degree for students in the College of Literature and Arts. It is open only to students who are enrolled *in the department of music.* Courses 7 and 8 are counted for credit for all students who take them.

1. History of Music.—Lectures on the development of music from its beginning among the Greeks to the present day, including the rise of dramatic music, the origin and progress of the oratorio, the evolution and development of instrumental forms, and studies

in the lives of the composers. Assigned collateral readings. *Fall, winter, and spring terms, three-fifths credit.* Miss PUTNAM.

2. THEORY OF MUSIC.—a. A course in harmony, two hours a week, in class, through four terms. *Emery's Harmony* with additional exercises. *Weitzman*'s *Theory of Music. Four credits.*

b. A course in counterpoint, two hours a week in class through two terms. *Richter's Counterpoint. One credit.*

c. A course in fugue, two hours a week in class through two terms. *Richter's Fugue. One credit.*

d. A course in musical analysis which may be taken at the same time with the studies in counterpoint and fugue. The second, third, and fourth parts of this course are open only to advanced students showing special aptitude. *One credit.* Miss PUTNAM.

3. COURSE FOR THE PIANO.—(a) *Preparatory.* This course is equivalent to three years' work. It includes formation and position of fingers, hands, wrists, and arms, properties of touch, principles of technique, thorough drill in scale and arpeggio playing, and exercises in accent, rhythm, and expression. Music used: Herz, Scales and Exercises; Loeschhorn, Op. 65, 66; Lemoine, Op. 37; Heller, Op. 45; Bertini, Op. 29, 32; Czerny, Op. 299, Bks. 1, 2; Bach's Little Preludes; also sonatinas and easier sonatas and compositions by Clementi, Kuhlau, Haydn, Mozart, Mendelssohn, Merkel, Dussek, Diabelli, Grieg, Bargiel, and others. Miss FOX.

(b) *Collegiate.* First year. Studies in development of technique: Czerny, Op. 299, Bks. 3, 4; Czerny, Octave Studies; Cramer, Études; Jensen, Études; Bach, Two-Voice Inventions and French Suites; sonatas of Haydn and Mozart; easier Sonatas of Beethoven; Songs Without Words, Mendelssohn; compositions (smaller works) of Beethoven, Chopin, Schubert, Raff, Grieg, Chaminade, Moszkowski, and others. Professor JONES and Miss FOX.

Second Year. Daily technique; Czerny, Op. 740; Bach, Three-Voice Inventions and English suites; sonatas and other compositions of Scarlatti, Beethoven, Schubert, Schumann, Mendelssohn, Weber, Raff, Rubinstein, St. Saens, Godard, MacDowell, and others. Professor JONES and Miss FOX.

Third Year. Selections: Clementi, Gradus ad Parnassum; Moscheles, Op. 70; Kullak, Seven-Octave Studies, Bk. 2; Bach, Well-Tempered Clavichord; sonatas and concertos by Mendelssohn, Weber, Beethoven, Hummel, Brahms, etc.; selections from works of Bach, Chopin, Schubert, Schumann, Brassin, Rubinstein, Liszt, Moszkowski, Scharwenka, and other modern composers. Professor JONES.

Fourth Year. Selections: Octave Studies; Clementi, Gradus, continued; Bach, Well-Tempered Clavichord, continued; Chopin, Études; Henselt, Études; Rubinstein, Études; sonatas by Beethoven, and concertos and other compositions by the great masters, classic and romantic, both of the older and the more modern schools. Professor Jones.

4. a and b. Course for the Organ.—Similar preparatory and collegiate courses for the organ will be offered for anyone caring to make this the principal instrument. Professor Jones.

5. Course for the Voice.—(a) *Preparatory.* The placing of the voice and proper position of the mouth and throat. Randegger's Singing. The first fifteen of the Fifty Conçone Studies. Simple songs for rhythm, accent, and proper pronunciation of words.

(b) *Collegiate.* First Year: Voice production, Randegger's Singing continued. All the Fifty Conçone Studies. Songs of Mendelssohn, Schubert, and those of good modern composers.

Second Year: Voice production. Viardot-Garcia's Hour of Study. Book I for technical work. Twenty-five and Fifteen Conçone Studies for soprano and tenor and the Forty Conçone for alto and bass. Songs of German, French and English composers, and simple selections from operas and oratorios.

Third Year: Voice production. Viardot-Garcia's Hour of Study, Book II. Bordigni's Thirty-six Studies for soprano or tenor, its equivalent, Sieber or Bordese for alto or bass. Selections from oratorios and from French, German and Italian operas. Songs of considerable difficulty by German, English, French, and Italian composers.

Fourth Year: Voice production. The Twenty-four Panofira Studies. Lütgen's Operavocalisen, Book II. Italian, French, German, and English songs of all standard composers. Solos and concerted work from the modern as well as the standard operas and oratorios. Miss Fernie.

6. Course for the Violin.—(a) *Preparatory.* Violin methods by Hermann, Kayser, Sitt, Mazas, etc. Schradieck's Technical Studies. Études by DeBeriot, Murts. Easy solos.

(b) *Collegiate.* First Year: Etudes by Kreutzer, Mazas, Fiorillo, etc. Concertos by Viotti, Rode, Kreutzer, DeBeriot. Sonatas by Mozart, Beethoven, Handel, Gade.

Second Year. Etudes by Rode, Gavinies and Campagnoli. Concertos by Spohr, Bruch, Vieuxtemps, Molique, etc. Sonatas by Beethoven and Grieg.

Third Year: Caprices by Paganini. Concertos by Bruch, Mendelssohn, Saint Saens, Joachim. Ensemble work.

Fourth Year: Bach sonatas. Concertos by Beethoven, Bruch, Brahms, Tschaikowsky, Dvorak, Saint Saens. Ensemble work. Miss PUTNAM.

7. University Orchestra. *Two hours' rehearsal once a week throughout the year. Two-fifths credit.* Professor JONES.

8. University Oratorio Society. *One hour rehearsal once a week throughout the year. One-fifth credit.* Miss FERNIE.

PALEONTOLOGY*

1. ADVANCED PALEONTOLOGY.—The work outlined under geology 1d can do little more than introduce the general subject. To those who desire a better acquaintance with paleontology a course of two terms is offered.

This course will include: (a) Discussion of the biological relations to fossil forms along the lines indicated in Williams's Geological Biology; (b) a discussion of the principles of classification as applied to fossils, together with the characteristics which distinguish the larger groups, using Nicholson and Zittel as guides; (c) a study of the distribution and variations of the genera and species of one or more of the more important groups as illustrated by the collections of the University, using the various state reports and Miller's Handbook as aids. Ten hours per week. *Winter and spring terms, at 10, full credit.* Professor ROLFE and Mr. HUBBARD. A major in botany and zoölogy would aid the student greatly in this work, but neither is "required."

Required: Geology 1.

PEDAGOGY

1. THE PSYCHOLOGY OF THE TEACHING PROCESS.—(a) The nature and organic elements of the process deduced, and exemplified in various subjects. (b) The science of the recitation deduced from the foregoing, including the central principles of school organization and management. *Fall term, at 1.20, full credit.* Professor TOMPKINS and Assistant Professor MCGILVREY.

Required: Two years of University work.

2. THE UNIVERSAL AIM AND METHOD OF EDUCATION, as determined by the nature of spiritual life.—(a) In its twofold ethical

*See also under geology and mineralogy

tension between ideal and real, and subject and object; (b) In its logical processes of unity with the objective world. *Winter term, at 1.15, full credit.* Professor TOMPKINS.

Required: Two years of University work.

3. THE BEAUTIFUL AS A FACTOR IN EDUCATION, in relation to the ethical and logical aspects already developed.—(a) The esthetic interpretation of the world—the process and educational value. (b) The interpretation of literature and art, with consideration of a course of reading and literature for schools. *Spring term, at 1.20, full credit.* Professor TOMPKINS and Assistant Professor MCGILVREY.

Required: Pedagogy 2.

4. THE PSYCHOLOGICAL FACTOR IN EDUCATIONAL METHOD.—(a) The course and law of the pupil's unfolding from infancy to full maturity—educational psychology. (b) The course of study as determined by the psychological factor, and the problem of gradation. *Fall term, at 10, full credit.* Professor TOMPKINS.

Required: Pedagogy 2, 3.

5. SPECIAL METHODS IN SUBJECTS, as determined by the logic of the subject and by the learning mind.—(a) The logical constitution of the subject under consideration ascertained. (b) The psychological unfolding of the subject in the process of learning. *Winter term, at 10.10, full credit.* Professor TOMPKINS.

Required: Pedagogy 1, 2, 4.

6. SPECIAL METHODS IN SUBJECTS, continued as above, with special emphasis on lesson planning, involving pedagogy 1, 2, 4. *Spring term, at 10, full credit.* Professor TOMPKINS and Assistant Professor MCGILVREY.

COURSES FOR GRADUATES

101. THE NATURE AND PURPOSE OF EDUCATION, as revealed in the nature and purpose of life, as interpreted in literature and philosophy. This requires an educational interpretation of the leading systems of philosophy from Socrates to Spencer, and also of the leading literary writers, such as Browning, Carlyle, and Emerson.

102. UNIVERSAL METHOD IN EDUCATION, as determined by the three organic phases of life—logical, ethical, and esthetical; educational psychology and the theory of cognition; the course of the complete development of the being to be educated.

103. THE PHILOSOPHY OF METHOD, illustrated in the teaching of various subjects.

104. THE PHILOSOPHY OF SCHOOL ORGANIZATION, MANAGEMENT, AND SUPERVISION, in the light of the nature of social organization, and the purpose and process of education, involving an interpretation of institutional life and sociological theories.

105. EDUCATIONAL IDEALS AND METHODS: (a) Their historical development; (b) present condition, problems, and theories of education.

106. SCHOOL SYSTEMS.—These are studied as determined by their historical setting and the prevailing philosophical theories of the times.

PHILOSOPHY

1. OUTLINES OF PHILOSOPHY.—This course is offered for the benefit of students who can give only a single term to the study of philosophy. The most important problems in philosophy and metaphysics are presented. *Fall term, at 8, full credit.* Assistant Professor DANIELS.

2. ANCIENT AND MEDIÆVAL PHILOSOPHY.—A rapid survey is taken of the development of speculative thought, beginning with the early Greek philosophers and continuing through the mediæval period. *Fall term, M., W., F., at 10, three-fifths credit.* Assistant Professor DANIELS.

3. MODERN PHILOSOPHY.—This course considers the formation and development of the problems and conceptions in philosophy from Descartes to the present time. Selections from the philosophical masterpieces of this period are carefully studied. Special emphasis is laid upon the philosophy of Kant. *Winter and spring terms, M., W., F., at 10, three-fifths credit.* Assistant Professor DANIELS.

4. METAPHYSICS.—This course consists of a somewhat critical and thorough study of subjects of special prominence in philosophy; *e. g.*, realism, idealism, and the theory of knowledge. No text-book is used. Topics are assigned and papers, prepared by the students, are read and discussed in the class. To promote acquaintance with current philosophical thought various articles on different aspects or problems of modern philosophy are read and criticised. *Winter term, Tu., Th., at 10.10, two-fifths credit.* Assistant Professor DANIELS.

5. ADVANCED PHILOSOPHY.—The work consists in a critical study of *Lotze's Microcosmus,* together with supplementary readings and discussions upon suggested topics. The course is designed for

somewhat advanced students, and is open to those who have received at least two credits in philosophy. *Fall and winter terms, at 2.20, full credit.* Assistant Professor DANIELS. [Not given in 1898-99.]

Required: Philosophy 2, 3, 4.

6. PRACTICAL ETHICS.—In this course those questions which bear the closest relation to life and conduct are raised and discussed. The duties of the individual, the family, and the state are among the subjects considered. Special subjects in social ethics may be taken up. *Spring term, Tu., Th., at 8, two-fifths credit.* Assistant Professor DANIELS.

7. HISTORY AND CRITICISM OF ETHICAL THEORIES.—A careful and historical examination of the various types of ethical theory, including rational, hedonistic, eudemonistic, esthetic, and evolutional ethics. It is designed to make the student as familiar as the time allows with the writings of representative men of the various schools. *Spring term, M., W., F., at 8, three-fifths credit.* Assistant Professor DANIELS.

8. LOGIC.—For the required credit in philosophy, students may select either of the following courses:

a. This course considers the nature of judgment and inference. Emphasis is laid upon practice in division, definition, forms of syllogism, deductive and inductive fallacies. This course is recommended to students who are interested in psychology or philosophy. *Fall and winter terms, Tu., Th., at 9, half credit.* Assistant Professor DANIELS.

b. Special attention is given to fallacies and to the problems, grounds, and principles of induction. The study is designed not only to direct the student in practical reasoning and correct thinking, but also to familiarize him with the principles and methods of scientific investigation. *Spring term, at 1.20, full credit.* Assistant Professor DANIELS.

9. CONTEMPORARY PHILOSOPHICAL THOUGHT.—The aim of this course is to present the philosophical views of several thinkers of the present time. Special attention is given to the philosophy of Herbert Spencer. Lectures and prescribed reading. *Fall term, at 2.20, full credit.* Assistant Professor DANIELS.

Required: Philosophy 1, 2, 3.

10. ESTHETICS.—A brief history and a critical study of the various theories of the beautiful. Lectures and assigned readings. *Fall term, M., W., Th., at 11, three-fifths credit.* Assistant Professor DANIELS. [Open to juniors and seniors.]

COURSE FOR GRADUATES

101. The Philosophy of Kant.

PHYSICAL TRAINING

1. Gymnasium Practice.—All members of the freshman class are required to present themselves for physical examination upon registration and as often thereafter as directed by the professor in charge. Class work in gymnastics is required of the members of this class on two days of the week.

FOR MEN

2. Lectures and Practical Demonstrations.—This course is offered to students who wish to gain a better comprehension of the value of physical exercise, and how to train properly for athletic contests, so as to avoid the ill-effects which too often follow a course of athletic training.

During the fall term the subject of applied anatomy receives attention—the muscles and their action, with the various methods of developing their power; first aid to the injured; how to prevent and correct physical deformities; specific exercises and their effects on the organs of the body, etc.

During the winter term, instruction is given on such topics as the following: The effects of exercise and training on the action of the vital organs; diseases from overwork, their prevention and cure; personal hygiene, sleep, diet, tobacco, alcohol, etc. *Fall and winter terms, at 3.20, once a week, one-fifth credit.* Associate Professor Everett.

FOR WOMEN

3. Gymnasium and Field Practice three hours a week for two years. This includes the two hours of course 1.

This course taken with course 4 counts for two credits. The first year of work with course 4 counts for one credit.

FOR MEN AND WOMEN

4. Hygiene.—This course is the same as physiology 6, which see, p. 232.

PHYSICS

1. General Physics.—A course of experimental lectures. The subjects treated are mechanics and heat, fall term; electricity and magnetism, winter term; sound and light, spring term. The course is required of students in the College of Engineering, and

students of physics, chemistry, and mathematics in the College of Science. The course is to be taken in connection with the laboratory course, physics 3. Lectures three times a week with a quiz hour. *Fall, winter, and spring terms, Lecture, M., W., F., at 11; Quiz, Tu., Th., at 10, three-fifths credit.* Professor CARMAN and Mr. CARPENTER.

Required: Math. 3 or 4.

2. See Physics 1 and 3 for fall term.

3. INTRODUCTION TO PHYSICAL MEASUREMENTS.—A laboratory course running parallel with physics 1, and required of the same students. The course consists of a list of quantitative experiments, illustrative of the lectures in general physics, and introductory to more advanced laboratory work. One period of three hours each week. *Fall, winter, and spring terms, two-fifths credit. Arrange hours.* Mr. QUICK and Mr. CARPENTER.

Required: Math. 3 or 4.

4. ELECTRICAL AND MAGNETIC MEASUREMENTS.—An advanced lecture and laboratory course in the theory and use of electrical and magnetic measuring instruments. Required of students in electrical engineering, and open to others. *Fall term, Lecture, 1.20; Laboratory, arrange hours, half credit; winter and spring terms, Lecture, 1.20; Laboratory, arrange hours, one credit.* This course may be taken for *one and one-half credits in the winter term, and a half credit in the spring term.* Assistant Professor SAGER.

Required: Physics 1 and 3; Math. 9.

5. ADVANCED PHYSICAL MEASUREMENTS.—A laboratory course supplemented by recitations and lectures. This course presupposes physics 1 and 3 or equivalents. It gives practice in exact physical measurements, and an experimental acquaintance with the more accurate methods of determining various physical constants. *Fall, winter, and spring terms, three times a week, three-fifths credit. Arrange hours. This course can also be taken for a full credit.* Professor CARMAN and Assistant Professor SAGER.

Required: Physics 1 and 3. Math. 9 desired.

6. INTRODUCTION TO THEORETICAL PHYSICS.—A course of lectures and recitations, taking up dynamics, fall term; theory of electricity and magnetism, or optics, winter term; and thermodynamics or optics, spring term. Each term is made independent as far as possible. *Fall and winter terms, M., W., F., at 1.20; spring term, M., Th., F., at 1.20, two-fifths credit.* Professor CARMAN and Assistant Professor SAGER.

Required: Physics 1 and 3; Math. 9.

7. INVESTIGATION OF SPECIAL PROBLEMS.—An advanced laboratory course in continuation of physics 5. The student is given one or more special subjects of investigation to be conducted throughout the year under the direction of the professors of the department, and special facilities will be provided for the work, either by buying special apparatus or by making it in the machine shop of the department. *Fall, winter, and spring terms, full credit. Arrange hours.* Professor CARMAN and Assistant Professor SAGER.

Required: Physics 5 or equivalent.

8. MATHEMATICAL PHYSICS.—A course of lectures and recitations. The subjects treated are changed each year, and are arranged to cover the general subject in two consecutive years, each year being complete in itself. The subjects for 1898-99 are theory of electrical and magnetic potential, and Maxwell's Theory of Electricity and Optics, using in the latter course Boltzmann's and Poincaré's lectures as references. Three times a week through the year. *Fall, winter, and spring terms, three-fifths credit. Arrange hours.* Professor CARMAN.

Required: Physics 4, and 5 or 6; Math. 9 (16 desired).

9. ADVANCED ELECTRICAL MEASUREMENTS.—A course in the theory and practice of the calibration of electrical measuring instruments, using the potentiometer and other standard methods. *Spring term, Tu., Th., at 1.20, two-fifths study.* Assistant Professor SAGER.

Required: Physics 4.

GRADUATE COURSES

101. Advanced Physical Measurements and Investigation. One to three credits.

102. Mathematical Physics. One to three credits.

PHYSIOLOGY

1. MAJOR COURSE.—This course is founded on the previous thorough training of the student in Physics, Chemistry, and Zoölogy. The course is designed primarily to prepare those taking it to enter upon the study of medicine. The work begins with a comprehensive study of the microscopic structure of the tissues in general, and later includes the structure of the organs in particular, with special relation to their functions. The course includes a very complete study of physiological chemistry, so far as it relates to the

normal composition and functions of the organs and excretions. Frequent demonstrations in experimental physiology are given before the class, and the student is required to perform a number of such experiments under the immediate direction of the instructor. In addition, the students, working in small groups, will be required to perform assigned experiments, and to submit their records and data for examination and criticism. Practical laboratory work is insisted on throughout. *Fall, winter, and spring terms, at 10, full credit.* Professor KEMP.

Required: Physics 1, 3; Chemistry 1, 2, 3a, 5a, 9; Zoölogy 3.

2. ADVANCED COURSE.—Continuation of physiology 1, through a second year. Students are not advised to take physiology 1 unless they contemplate taking physiology 2, but if they should be unable to do this they will be given credit for physiology 1, although it will leave some parts of the field uncovered. *Fall, winter, and spring terms, at 10, full credit.* Professor KEMP.

3. INVESTIGATION AND THESIS.—The laboratory of the physiological department is well equipped with instruments of precision for research in histology, physiological chemistry, experimental physiology, and pharmacology. Every facility and encouragement, so far as the resources of the laboratory permit, are offered to those prepared to avail themselves of these for researches leading to theses for the bachelor's, master's, or doctor's degree, or for carrying on original work for publication.

4. MINOR COURSE.—This course is planned for literary students and for students of natural science specializing in other lines. Especial emphasis is laid upon those facts that serve as a basis for practical hygiene. *Winter term, at 2.10, full credit.* Professor KEMP.

Required: Chemistry 1; Zoölogy 10.

4a. Selected laboratory work to supplement physiology 4. *Spring term, full credit. Arrange hours.* Professor KEMP.

Required: Physiology 4.

5. ADVANCED PHYSIOLOGY.—There are here included the following lines of laboratory work, any one or more of which may be pursued independently of the others. (a) The physiology of foods, and digestion; (b) the blood, circulation, and respiration; (c) the excretions, especially urine-analysis; (d) general physiology of nerve and muscle; (e) advanced vertebrate, especially human, histology. Work to be arranged after consultation with Professor KEMP.

6. HYGIENE.—This course is offered to both men and women, and must be taken by young women who take physical training for credit. It is designed to impart a knowledge of the conditions of bodily health and activity. The course deals with those practical hygienic problems of everyday life that are wholly or in large part under the control of each individual. *Fall and winter terms, Tu., at 3.20, one-fifth credit.* Professor KEMP.

PSYCHOLOGY

1. GENERAL ELEMENTARY PSYCHOLOGY.—This course is designed for those who have not before studied psychology. The whole field of psychology is covered as thoroughly as the time will permit, and a substantial basis is given for later studies in psychology, philosophy, and pedagogy. *Fall term, at 8, and at 2.20, full credit.* Dr. HYLAN.

Required: At least one year of University work.

2. EXPERIMENTAL PSYCHOLOGY.—The object of this course is to give the student an acquaintance with normal psychical phenomena, and training in laboratory methods and the use of apparatus. The first term will be devoted largely to experiments in sensation, and a development into the higher psychic functions. In the second term, attention, memory, association, habit, emotion, and volition are among the subjects treated. Each student is required to keep a careful record, in notes and drawings, of the experiments performed, and to become familiar with the literature. *Winter and spring terms, Tu., Th., at 8, and 7 hours of laboratory, to be arranged, full credit.* Dr. HYLAN.

Required: Psychology 1.

3. COMPARATIVE PSYCHOLOGY.—In this course the development of mind is traced through the animal scale, beginning with the lowest animal forms. The higher forms of mental development are correlated with the mental activities of the child and the savage. A special laboratory is accessible for the study of the psychic powers of chicks, frogs, protozoa, etc., and experimental work will form a prominent feature of the course. *Romanes* and *Lloyd-Morgan,* with studies in anthropology and child life. *Winter and spring terms, M., W., at 2.20, and 3 hours of laboratory to be arranged, three-fifths credit.* Dr. HYLAN.

Required: Psychology 1.

4. GENETIC PSYCHOLOGY.—It is the plan of this course to take up in their natural order the various developmental stages of the

human mind from the earliest days of infancy. The more substantial results of child study serve as a basis for the first part of the course, while the latter part is devoted to the phenomena of adolescence and the intellectual problems confronting the youth. The development of the nervous system and growth of the body are traced in connection with the mental development, and the critical periods of both are given careful attention. The aim of the course is to serve as a basis for pedagogy, and to assist the student in solving intelligently, and from the standpoint of psychology, the ethical and social problems of his own life. *Saturday, at 10, throughout the year, three-fifths credit.* Dr. HYLAN.

Required: Psychology 1.

8. PSYCHOLOGICAL SEMINARY.—In this course, for the coming year, the history of psychology will be taken up, beginning with Locke and continuing down through its experimental development, including the recent aspects of the subject. During the latter part of the year periodical literature will serve as the basis of reports. *Once a week; two credits for the year.* Dr. HYLAN.

Required: Psychology 1, 2, and Philosophy 3.

10. THE SENSE ORGANS AND CENTRAL NERVOUS SYSTEM.—In this course the structure and physiology of the sense organs and central nervous system are taken up. Each student is required to mount about twenty sections of the sense organs, spinal cord, and different cortical areas of the brain, and to study them by means of the microscope. The object of the course is to furnish a satisfactory basis for experimental and advanced psychology. *Fall term, M., W., at 3.20; laboratory 4 hours, to be arranged; three-fifths credit.* Dr. HYLAN.

Required: Zoölogy 1a, or its equivalent in laboratory practice.

COURSE FOR GRADUATES

101. RESEARCH COURSE.—Though primarily for graduates, this course may be taken by seniors who give evidence of suitable preparation. If laboratory work, it must be preceded by Psychology 1, 2, and 10. For other than a laboratory subject the required preparation will depend upon the subject. It is intended that work in this course shall result in contributions to science. Dr. HYLAN.

PUBLIC LAW AND ADMINISTRATION

1. POLITICAL INSTITUTIONS.—Comparative study of modern political systems, their historical development and practical operation. Lectures, assigned readings, reports, and discussions. The

fall term is devoted to the leading features of national and state government of the United States; in the winter term the governments of the leading European states are studied; in the spring term topics in political methods are considered, such as the primary, the nominating convention, Australian ballot, proportional representation, etc. *Fall, winter, and spring terms, M., W., F., at 9, three-fifths credit.* Assistant Professor TOOKE.

2. JURISPRUDENCE.—Elementary course in the origin, development, and classification of law, followed by an introduction to the fundamental principles of the English Common Law. *Fall, winter, and spring terms, Tu., Th., at 10, two-fifths credit.* Assistant Professor TOOKE.

3. ROMAN LAW.—Early history. The classical jurisprudence. Legislation of Justinian. Influence of the Roman system. Readings and lectures. *Winter and spring terms, Tu., Th., at 10, two-fifths credit.* Assistant Professor TOOKE.

Required: A reading knowledge of Latin.

4. INTERNATIONAL LAW.—Sources and historical development. Essential powers of states, their rights and their obligations. Laws and usage in time of war. History of American diplomacy. *Winter and spring terms, M., W., F., at 8, three-fifths credit.* Assistant Professor TOOKE.

Required: Public Law and Administration 1.

5. COMPARATIVE ADMINISTRATIVE LAW.—General principles of administrative law of the United States (national and commonwealth), England, France, and Germany. The appointment, tenure, and duties of officers. Historical and comparative study of local government. *Fall, winter, and spring terms, M., W., F., at 10, three-fifths credit.* Assistant Professor TOOKE.

Required: Public Law and Administration 1 and 2.

6. COMPARATIVE CONSTITUTIONAL LAW.—A comparison of the leading states of Europe, and of North and South America, special attention being paid to the constitutional law of the United States, England, Germany, and France. The work of the fall term is American constitutional law, text-book and assigned cases; that of the winter term is a comparative study from original sources of constitutions of the leading European states. In the spring term, the theory and practice of the South American constitutions are considered. *Fall, winter, and spring terms, M., W., F., at 10, three-fifths credit.* Assistant Professor TOOKE.

Required: Public Law and Administration 1, 2. [Not given in 1898-99.]

7. MUNICIPAL CORPORATIONS.—History and legal status of the American municipality. To supplement course 5. *Fall and winter terms, Tu., Th., at 3.20, two-fifths credit.* Assistant Professor TOOKE.

9. SEMINARY IN MUNICIPAL INSTITUTIONS.—Open to graduates and seniors taking courses 5 and 7. *Fall, winter, and spring terms, two-fifths credit.* Assistant Professor TOOKE.

RHETORIC

1. RHETORIC AND THEMES.—Required for students in the College of Literature and Arts. *Three hours a week; fall, winter, and spring terms. M., W., F., at 8, at 10, and M., Tu., Th., at 2.20.* The course counts for two credits. Assistant Professor T. A. CLARK and Miss COOK.

2. RHETORIC AND THEMES.—Required for students in the Colleges of Agriculture, Science, and Engineering. *Three hours a week; fall, winter, and spring terms, M., W., F., at 8, at 9, and at 10.* The course counts for two credits. Assistant Professor T. A. CLARK and Miss COOK.

3. DAILY THEMES.—Higher English Composition. *Two hours a week; fall, winter, and spring terms, Tu., Th., at 9, and at 11, full credit.* Assistant Professor T. A. CLARK.

Required: Rhetoric 1 or 2.

4. ARGUMENT.—This course is devoted to lectures and textbook work on the principles of argumentative discourse. Weekly practice in the writing of arguments is required. *Winter term, M., W., F., at 9.15, full credit.* Assistant Professor T. A. CLARK.

Required: Rhetoric 1 or 2.

SOCIOLOGY

[See under Anthropology and Economics.]

SPANISH

1. GRAMMAR AND READING.—Edgren's Spanish Grammar; Knapp's Spanish Readings; Cervantes' Don Quijote; outlines of Spanish literature. *Fall, winter, and spring terms, arrange hours, full study.* Assistant Professor FAIRFIELD.

THEORETICAL AND APPLIED MECHANICS

[See Mechanics, p. 216.]

VETERINARY SCIENCE

1. Anatomy and Physiology.—The anatomy and physiology of the domestic animals constitute the subjects of instruction for one term. The instruction is given by lectures aided by demonstrations with use of skeletons, and of other apparatus as follows: Dr. Auzoux's complete model of the horse, which is in ninety-seven pieces and exhibits three thousand details of structure; papier-maché model of the horse's foot; the teeth of the horse; and dissections of animals. This work is supplemented with the study of text books. *Strangeways's Veterinary Anatomy and Mill's Animal Physiology. Fall term, at 11, full credit.* Professor McIntosh.

2. Principles and Practice of Veterinary Medicine.—This subject is taught by lectures and text-books on the diseases of domestic animals, and is illustrated with specimens of morbid anatomy and by observations and practice at the clinics. The latter are held at the veterinary infirmary once a week. The students assist in the operations, and thus obtain a practical knowledge of the subject. Dissections and post-mortems are made as cases present themselves. Text-books: *Diseases of Horses and Cattle, by D. McIntosh, and Williams's Practice of Veterinary Medicine and Surgery. Winter and spring terms, at 11, full credit.* Professor McIntosh.

3. Veterinary Materia Medica.—This subject, which treats of the agents for the cure of disease or injury, or for the preservation of health among domestic animals, is taught by lectures and text-books, illustrated by specimens of the drugs used in veterinary practice. The compounding of medicines also receives attention. *Fall, winter, and spring terms, at 9, full credit.* Professor McIntosh.

ZOÖLOGY

1. General Zoölogy, Major Course.—The work here described forms a continuous course, beginning in the winter term of the freshman year and ending with the fall term of the sophomore year. It is devoted especially to a series of laboratory studies of animal types, and to lectures on the morphology, physiology, and relations to nature of this selected series. It is divided into three sub-divisions consisting of one term each. The first term's work may be taken separately as a minor by students not in the natural science group.

a. The laboratory work of the first term includes dissections of the earthworm, serial sections of this form and of Hydra, and

numerous studies and preparations of the Protozoa. Lectures on the structure, physiology, and classification of the Protozoa, their relations to plants and to the organization, embryological development, and history of the higher animals are made to elucidate and illustrate the general theory of zoölogy. The general zoölogy of the remaining lower invertebrate forms, including Vermes, finishes the work of the term.

b. The second term is devoted to the morphology, physiology, and general classification of the remaining invertebrates, principal attention being given to the Arthropoda. It is directed especially towards the entomological courses of this department. The laboratory work includes a special study of the crayfish, and of the embryology of the potato beetle, followed by a considerable amount of semi-independent work upon the invertebrate fresh water fauna of the region.

c. The third term's work is on vertebrates, and in the laboratory principal attention is given to the anatomy of necturus, and anatomical and systematic studies of fishes and birds, supplemented by work in the museum on the osteology of mammals and examination of mounted specimens. The general method is that of comparative anatomy, with special reference to the anatomy of man, this part of the course being directed particularly towards the physiological courses of the University which follow upon it. Philosophical zoölogy takes the form in this term of a course of lectures on the general theory of organic development, illustrated by a systematic study, by lectures and reading, of the modern doctrine of the descent of man. *Winter and spring terms, at 8, and at 10; fall term, at 1.20, full credit.* Assistant Professor SMITH.

Required: An entrance credit in chemistry, or chemistry 1, an entrance credit in zoölogy, or zoölogy 10 or 11. Art and design 1 must be taken with this course if it has not been taken previously.

2. This course consists of the first and second terms' work of zoölogy 1. It is intended especially to serve as a thorough zoölogical preparation for general entomology (zoölogy 6). It will be accepted as a minor instead of zoölogy 10. *Winter and spring terms, full credit.*

Required: Same subjects as for course 1.

3. This course consists of the first and third terms' work of course 1. It is intended to serve as a thorough zoölogical preparation for physiology 1, and is especially commended to students contemplating the study of medicine. *Winter and fall terms, full credit.*

Required: Same subjects as for course 1.

4. Embryology.—Lectures, laboratory, and reference work. This course begins with a study of the germ cells, and the process of maturation, fertilization, cleavage, and gastrulation from preparations furnished to the student. The study of the development of the vertebrate form in the chick and the pig is then taken up, with preparations of the amphibian embryo for comparison. Opportunity is offered for instruction in methods of preparing embryological material, and of making graphic and plastic reconstructions from serial sections. *Hertwig-Marks' Embryology of Man and Mammals and Marshall's Vertebrate Embryology. Winter term, at 1.15, full credit.* Assistant Professor Kofoid.

Required: Zoölogy 1 or 3.

5. Advanced Zoölogy.—To students who have had course 1, 2, or 3, an opportunity is offered for advanced work in zoölogy. It may be closely adapted to the bent and ability of the student. Three main lines of work will, however, be especially provided for: (a) Systematic reading of general zoölogy, together with lectures on the history of zoölogy and on the morphology, physiology, and œcology of special groups. (b) Seminary work, consisting of the collating, indexing, and abstracting of a scattered literature on assigned or selected subjects, and the preparation of papers based on these bibliographical and literary studies. These papers will be criticised as a means of education in the preparation of scientific manuscript for the press. Regular instruction in natural history drawing sufficient to enable the student to prepare illustrations for reproduction by the ordinary methods will be made a part of this course. (c) Zoölogical research work, which will usually take the form of an investigation of a limited subject, carried forward with whatever guidance and instruction, the nature of the subject and the ability of the student may require. Students so desiring may pursue a research course at the University Biological Station on the Illinois River during the summer vacation months, and will receive credit therefor.

Seminary and research work will be required of all students purposing to graduate with a zoölogical thesis. *Fall, winter, and spring terms, at 1.20, full credit.* Professor Forbes.

Required: Zöology 1, 2, or 3.

6. General Entomology.—This course of two terms should be taken by preference in the sophomore year. It is practically a sequel to course 2 in general zoölogy, the work of the second term of that course being directed especially towards entomology.

Presuming upon a general knowledge of the Arthropoda, the instruction begins with more detailed work on Insecta. The greater part of the course consists of laboratory studies of the structure and classification of insects; practice in the determination of species and the description and illustration of species and structures; field work and observation, including the collection of specimens of all orders and stages, aquatic and terrestrial; office work in the preparation, labeling, and arrangement of collections; a systematic independent study of life histories of selected species, with full records, descriptions, and drawings; experimental insecticide work, and library practice in collecting, collating, indexing, and abstracting the literature of the species principally studied, concluding with a thesis on a single species studied both biologically and experimentally. Special instruction is given in this course in the art of entomological illustration, under the supervision of an expert zoölogical artist. *Winter term, lecture, Tu., Th., at 9.15; spring term, lecture, Tu., Th., at 10. Arrange for 8 hours of laboratory each term, full credit.* Professor FORBES.

Required: Zoölogy 1, 2, 8, 10, or 11.

7. ADVANCED ENTOMOLOGY.—Special courses will be arranged in either technical or practical entomology for students wishing to specialize extensively in this direction, and to such students the facilities of the State Laboratory of Natural History and of the State Entomologist's office will be freely open. *Fall, winter, and spring terms, full credit.* Professor FORBES.

Required: Zoölogy 5.

8. PRACTICAL ENTOMOLOGY.—This is a single term's work open, without conditions precedent, to University students, but offered for the special benefit of students in agriculture. By means of laboratory studies and lectures and field and insectary observations, students will be made familiar with the commonest and most important injurious insects, and with means of preventing or arresting their injuries. *Spring term, lecture, M., W., F., at 10. Arrange for 8 hours of laboratory work, full credit.* Professor FORBES.

9. THESIS INVESTIGATION.—Candidates for graduation in the College of Science who select a zoölogical subject as a thesis are required to spend at least three hours a day during their senior year in making an investigation of some selected zoölogical subject. While this work is done under the general supervision of an instructor, it is in its methods and responsibilites essentially original work. *Fall, winter, and spring terms, full credit.* Professor FORBES.

Required: Two years' major work in zoölogical courses, including Zoölogy 5b and 5c.

10. ELEMENTARY ZOÖLOGY.—This is a laboratory and lecture course on the morphology, physiology, and œcology of types selected from the animal kingdom. The work is so directed as to lead to a general acquaintance with zoölogical science, and to serve as a preparation for the more extensive and thorough work of zoölogy 1. It is offered as a minor to students in the College of Science not specializing in zoölogy, and as an unconditioned elective to members of other colleges. *Fall term, at 8, full credit.* Assistant Professor SMITH.

11. ELEMENTARY ENTOMOLOGY.—This is a laboratory and lecture course in general entomology, open to all University students, pursued without especial reference to economic ends, complete in itself, but leading to the major course in entomology (zöology 6). The laboratory work is strictly entomological, but the lecture course is in great measure a course in general biology, with entomological illustrations. *Fall term, at 10, full credit.* Professor FORBES.

COURSES FOR GRADUATES

101. SYSTEMATIC AND FAUNISTIC ZOOLOGY.—This course consists of studies of invertebrate animals (including insects), and of aquatic vertebrates, so directed as to give as nearly as possible an exhaustive knowledge of a taxonomic group or of a selected geographic assemblage. If a suitable taxonomic group is chosen, its space and number relations within a definite area will be thoroughly worked out by the precise methods of modern faunistic zoölogy, including quantitative collections made by uniform methods at regular periods, and the comparative measurement or enumeration of such collections. If a geographic assemblage be selected, critical determinative work will be followed by both qualitative and quantitative studies of the various groups associated, with a view to accumulating data for an examination of the interactions of the assemblage.

102. ADVANCED ECONOMIC ENTOMOLOGY.—This is a research course in systematic and experimental entomology which involves the application to insects injurious to agriculture and horticulture of the methods and general ideas of the preceding course. It is intended to prepare students in a thorough-going manner for first-class investigation work in this field, and for the direction of entomological operations in agricultural experiment stations.

DEGREES

BACHELORS' DEGREES

The usual bachelors' degrees are conferred upon those who satisfactorily complete the courses of study described under the different colleges and schools. A candidate for a bachelor's degree must pass in the subjects marked *prescribed* in his chosen course, and must conform to the directions given in connection with that course in regard to electives. In the colleges of Literature and Arts, of Science, and of Agriculture, 40 term-credits are required for graduation. In the College of Engineering and in the schools the candidate must complete the course of study as laid down. The number of credits required includes two for military science for men, and for women *may* include the same number for physical training. Men excused from the military requirements, and women who do not take courses in physical training, must elect in lieu thereof two extra terms' work in other subjects.

In all cases in which a thesis is required,* the subject must be announced not later than the first Monday in November, and the completed thesis must be submitted to the dean of the proper college by June 1st. The work must be done under the direction of the professor in whose department the subject naturally belongs, and must be in the line of the course of study for which a degree is expected. The thesis must be presented upon regulation paper, and will be deposited in the library of the University.

*See requirements for graduation in the different colleges.

1. The degree of Bachelor of Arts is conferred on those who complete a course in the College of Literature and Arts.

2. The degree of Bachelor of Science is given to those who complete a course in the College of Engineering, of Science, or of Agriculture. The name of the course will be inserted in the diploma.

3. The degree of Bachelor of Law is conferred on those who complete the course in the School of Law.

4. The degree of Doctor of Medicine is conferred on those who complete the course in the School of Medicine.

5. The degree of Bachelor of Library Science is conferred on those who complete the course in the School of Library Science.

6. The degree of Bachelor of Music is conferred on those who complete one of the courses in the School of Music.

7. The degree of Graduate in Pharmacy is conferred upon those who have satisfied the requirements therefor in the School of Pharmacy.

ADVANCED DEGREES

No degrees are given for study *in absentia*, except that graduates of this University, who become members of the Graduate School and reside elsewhere, may receive a second degree, upon the completion of their courses of study within not less than three years of the date of registration. For a graduate of this University who has won recognized distinction in a special line of investigation, and who otherwise fulfils the conditions for a doctor's degree, the requirement of residence for that degree will be such as may be imposed by the General Faculty of the University, on presentation of the case by the Council of Administration. Advanced degrees are conferred by the Trustees of the University only upon recommendation of the General Faculty, based upon information furnished by the Council of Administration.

SECOND DEGREES

The second degrees conferred by this University are as follows:

Master of Arts, after Bachelor of Arts.

Master of Science, after Bachelor of Science in courses of the Colleges of Agriculture and Science.

Master of Architecture, after Bachelor of Science in courses in Architecture and Architectural Engineering.

Master of Laws, after Bachelor of Laws in the School of Law.

Master of Library Science, after Bachelor of Library Science.

Civil Engineer, after Bachelor of Science in the course in Civil Engineering.

Electrical Engineer, after Bachelor of Science in the course in Electrical Engineering.

Mechanical Engineer, after Bachelor of Science in the course in Mechanical Engineering.

Pharmaceutical Chemist, after Graduate in Pharmacy.

Graduates of other colleges and universities having equivalent requirements for baccalaureate degrees may be given second degrees determined in kind by comparison with the usage described above.

All candidates for second degrees are required to register in the Graduate School; to conform to the conditions outlined under "Admission," "Registration," and "Examinations" [pp. 35, 43, 47]; to pursue an approved course of study for one academic year in residence, or, in the case of graduates of this University, for three years *in absentia;* and to pass satisfactory examinations upon all the studies of the approved course.

Each candidate for a second degree must present an acceptable thesis in the line of his major subject of study. The subject of this thesis must be announced to the Dean of the General Faculty not later than the first Monday in November of the academic year in which the course is to be completed. The completed thesis, upon regulation

paper must be presented, with the certified approval of the professor in charge, to the Council of Administration not later than June 1st.

The period of required study begins from the date of registration in the Graduate School.

DOCTOR'S DEGREE

The degree of Doctor of Philosophy, or Doctor of Science, may be conferred upon any member of the Graduate School of not less than three years' standing who shall have reached high attainments in scholarship, including a sufficient knowledge of the Latin, French, and German languages to serve the purposes of research in his principal specialty, who shall have shown marked ability in some line of literary or scientific investigation, and shall have presented a thesis giving clear indications of such scholarship and of such power of research. At least the first two, or the last one, of the three years of study must be in residence at the University, and the entire course of study must be in accordance with the regulations of the Graduate School.

The time and study required for a master's degree may be included in the three years required, but approval of a course of study for a doctor's degree must be upon the condition that the candidate is prepared through his baccalaureate work, or otherwise, to enter at once upon advanced studies in the line of his major subject, and that work on this major subject be continued through the three years.

The final examination of a candidate for the doctor's degree is conducted by a committee consisting of the head of the department under which the major subject has been pursued, as chairman, and of not less than two additional members of the General Faculty of the University, appointed for the purpose by the Council of Administration. This examination covers the subjects of the course approved for the degree, but is specially searching upon that on which the major work has been done. This examina-

tion occurs in the week preceding that upon which commencement day occurs.

Each candidate for a doctor's degree must announce to the Dean of the General Faculty a thesis subject not later than the first Monday in November of the academic year at the close of which the award of the degree is expected. A fair copy of the thesis must be submitted, with a certified approval of the committee on examinations, to the Council of Administration not later than the first day of June. If the thesis is approved by the Council the candidate must have it printed and must deposit not less than one hundred copies with the librarian of the University.

FELLOWSHIPS

The Trustees of the University have established eight fellowships, each with a stipend of three hundred dollars, payable in ten monthly installments.

The rules governing appointments to these fellowships are as follows:

1. The purpose of these fellowships shall be to promote advanced scholarship and original research in the University.

2. The fellowships shall be open to graduates of this and similar institutions. Those who are to complete an under-graduate course previous to the academic year for which appointments are made shall be eligible, with others, as candidates.

3. Nominations to fellowships, accompanied by assignments to special departments of the University for instructional work, shall be made by the Council of Administration to the Trustees of the University, upon applications received by the President of the University each year, not later than the twenty-fifth day of April. These nominations shall be made at a meeting of the Council called for that purpose within the month of May. The appoint-

ments by the Trustees are made at their regular meeting in June, and shall take effect the first day of the following September. Vacancies may be filled by similar nominations and appointments at other times.

4. Nominations to fellowships shall be made upon the grounds of worthiness of character, scholastic attainments, and promise of success in the principal line of study or research to which the candidate proposes to devote himself. Consideration shall also be given to the probable value or usefulness of the services of the candidate as an assistant in instruction, but this shall not be deemed the primary object of the appointment. Other things being equal, preference shall be given to those graduates of this University who have pursued a specialized course.*

5. Candidates must present, with their applications, full information concerning themselves and their qualifications for advanced study and research work, including any written or printed essays or results of investigation, and must name the subject in which they wish to do their major work.

6. Fellowships shall be good for one year. Appointments may not be usually renewed to the same persons, and in no case for more than one additional year; but an appointment as *honorary fellow*, without stipend, may be made as specified for paid fellowships in the case of any one who has held a regular fellowship and has shown distinguished merit in his work.

7. Fellows shall be constituted members of the Graduate School, shall have all of the privileges and bear all of the responsibilities of such membership. Each regular fellow may be called upon to render service in instruction throughout the year in the department in which his major subject lies, equal to one hour daily of class instruction or to two hours daily of laboratory supervision. Such service

*See pp. 55, 109. All members of the Colleges of Engineering and of Agriculture and of the chemical and mathematical groups in the College of Science shall be considered as pursuing specialized courses.

may receive such credit as the Council of Administration may determine in each case. Blank forms for applications may be obtained by addressing the Registrar.

SCHOLARSHIPS

STATE*

A law passed by the General Assembly of the State of Illinois at the session of 1895 provides that there shall be awarded annually to each county of the state one state scholarship, which shall entitle the holder thereof, who shall be a resident of the senatorial district to which he is accredited, to instruction in any or all departments of the University of Illinois for a term of four years, free from any charge for tuition or any incidental charge, unless such incidental charge shall have been made for materials used or for damages needlessly done to property of the University; *Provided*, that in counties having two or more senatorial districts there shall be awarded annually one additional scholarship for each of said senatorial districts.

A competitive examination under the direction of the Superintendent of Public Instruction shall be held at the county courthouse in each county of the state upon the first Saturday of June in each and every year by the county superintendent of schools upon such branches of study as said Superintendent of Public Instruction and the President of said University may deem best.

Questions for such examinations shall be prepared and furnished by the President of the University to the Superintendent of Public Instruction, who shall attend to the printing and distribution thereof to the several county superintendents of schools prior to such examinations.

The law also provides that in case the scholarship in any county is not claimed by a resident of that county, the Superintendent of Public Instruction may fill the same by

*These scholarships replace the honorary scholarships and the accredited school scholarships heretofore given.

appointing some candidate first entitled to a vacancy in some other county.

Candidates to be eligible to a state scholarship must be at least sixteen years of age, and must have been residents of their respective counties for the year preceding the examination.

A student holding a state scholarship who shall make it appear to the satisfaction of the President of the University that he requires leave of absence for the purpose of earning funds to defray his expenses while in attendance may, in the discretion of the President, be granted such a leave of absence, and may be allowed a period not exceeding six years from the commencement thereof for the completion of his course at said University.

The law contemplates that the candidate who passes this competitive examination should afterwards pass the regular entrance examination to the University. It has been thought best to combine these examinations so that the successful candidate may be admitted to the University without further examination. To this end the examination will be held on the first Saturday in June and the Friday preceding (June 3 and 4, 1898, and June 2 and 3, 1899). The subjects for examination will be the same as stated under the head of "Admission by Examination," pp. 29-35.

Any person, whether a candidate for a scholarship or not, may be examined for admission to the University at these state scholarship examinations.

MILITARY

Students who have gained six term-credits in class room military instruction and six such credits in drill practice, are eligible for appointment as commissioned officers of the battalion. Those attaining this rank may be awarded special scholarships, good for one year, and equal in value to the University term fees for the same length of time.

PRIZES

THE HAZLETON PRIZE MEDAL

Capt. W. C. Hazleton provided in 1890 a medal, of beautiful and artistic design, which is to be awarded, at a competitive drill to be held near the close of the year, to the best drilled student. Each competitor must have been in attendance at the University at least sixteen weeks of the current college year; must not have had more than four unexcused absences from drill; and must present himself for competition in full uniform.

The award is made for excellence in these particulars:

1. Erectness of carriage, military appearance, and neatness.

2. Execution of the school of the soldier, without arms.

3. Manual of arms, with and without numbers.

The successful competitor will receive a certificate setting forth the facts, and may wear the medal until the 15th day of May following, when it will be returned for the next competition.

IN ORATORY

The Trustees of the University appropriate every year the sum of one hundred dollars for prizes in debate. The amount is divided into three prizes, of fifty, thirty, and twenty dollars, respectively, and these are awarded to the three participants whose work is adjudged best.

The debate is held some time in the month of February. A preliminary contest takes place in December, and is open to all members of the three upper classes. From the list of contestants in the preliminary debate six are selected to take part in the final competition.

INTERSCHOLASTIC ORATORICAL CONTEST

A medal of the value of twenty dollars is offered annually by the University to the high schools of the state for the best oration delivered in a competitive contest between

their representatives. This contest takes place in the spring at the time of the interscholastic athletic meet.

BENEFICIARY AID

CHICAGO CLUB LOAN FUND

The Chicago Club of the University of Illinois offers two loans of $250.00 each, payable to the beneficiary, $100.00 the first year, $75.00 the second year, $50.00 the third year, and $25.00 the fourth year. The loans are offered to residents of Cook County, Illinois, only, and are to be awarded upon competitive examination to those obtaining the highest average grades. The loans are due six years after matriculation. They bear no interest while the student is in the University, but six per cent. after graduation. The examination questions are prepared at the University and cover the same subjects as those for the state scholarships.

The beneficiaries of this fund also have their incidental fees, amounting to $22.50 a year, remitted by the trustees.

CLASS OF 1895 LOAN FUND

This is a fund of $250.00, established by the class of 1895, to be loaned to needy and deserving students. According to the conditions of the gift, one-fifth of the amount is to be loaned annually, and is open to members of the freshmen class only. No person may receive the benefit of the fund more than four years. The loan bears interest at the legal rate from the time the recipient leaves the University, and is due, one-half in five years, and one-half in six years, after matriculation. The management of the fund is in charge of the Council of Administration.

SOCIETIES AND CLUBS

LITERARY SOCIETIES

The Adelphic and Philomathean societies for men, and the Alethenai for women, occupy spacious halls,

which the members have furnished and decorated with taste and elegance. Meetings are held Friday evenings throughout term time.

THE CHRISTIAN ASSOCIATIONS

The Young Men's and Young Women's Christian Associations are active and useful organizations, and have a large membership.

Subscriptions have been made by students and graduates, amounting to $23,000.00, toward a new building for these organizations. A canvass has been started outside with the hope of raising the sum to $32,000.00. If this is successful the building will be begun at once. An excellent site has been purchased.

CLUBS AUXILIARY TO COURSES OF STUDY

AGRICULTURAL CLUB

This club meets semi-monthly. It is devoted to the discussion of topics of theoretical and practical interest to students of agriculture. All students in the College of Agriculture are eligible to membership.

ARCHITECTS' CLUB

This club meets once in two weeks for the consideration of current topics of architectural interest and subjects connected with the study of architectural history. All students pursuing architectural studies are eligible to membership.

CIVIL ENGINEERING CLUB

This club meets the second and fourth Saturday evenings of each month for the reading and discussion of papers relating to civil engineering. All students pursuing the civil engineering course may become members.

THE ENGLISH CLUB

The English Club is composed of members of the Faculty, and of students who have done especially good work in English. The work of the club is confined to the study of recent writers of fiction and of poetry. The mem-

bership is limited to thirty. Meetings are held on the second Monday of each month.

FRENCH CLUB

Le Cercle Français includes students who have had at least one year's work in French. The club meets once a week throughout the year. Its proceedings are conducted in French, the object being to supplement the work of the class room by the practical handling and understanding of the language.

THE LATIN CLUB

This is an organization for the purpose of promoting interest in the language and institutions of the Roman world. It meets once in two weeks.

LIBRARY CLUB

The library staff and the Library School have organized a Library Club which meets once in three weeks throughout the college year. The club considers literary topics which are allied to the library work, but does not deal with the technical subjects which are included in the library school course.

MECHANICAL AND ELECTRICAL ENGINEERING SOCIETY

This club meets on the first and third Saturday evenings of each month. All students pursuing mechanical and electrical engineering studies are eligible to membership. Papers relating to subjects of interest to members are presented and discussed at each meeting.

MEDICAL CLUB

The Medical Club is composed of students, irrespective of courses and departments, who are preparing for medical study, or who are for any reason interested in medical subjects. Its programs consist of lectures by members of the biological faculty and by physicians, and of papers prepared by members of the club. It meets weekly.

MUSICAL CLUBS

These are described under the School of Music.

ZOÖLOGICAL CLUB

The University Zoölogical Club is composed of advanced students and instructors in the zoölogical and physiological departments, together with such other biological instructors and advanced students as are interested in its subjects. Its sessions are devoted to the presentation and discussion of abstracts of recent biological literature and of the results of investigation by the members of the club. It meets weekly in Natural History Hall.

SPECIAL ADVANTAGES FOR WOMEN

HOUSEHOLD ECONOMICS

No course of study is specifically outlined in household economics, but there are certain courses offered regularly, a combination of which affords the student a fair training in some branches of the subject. Such credit is given in each course as the work done justifies. The following courses may be mentioned.

1. Bacteriology (Botany 2).
2. Chemistry of foodstuffs (Chem. 5c and 18).
3. Physiology.
4. Household Decoration. Architecture 18.
5. Designing of Residences. Architecture 15.

THE FINE ARTS

Drawing and Painting.—Four years' work is offered in drawing, modeling, and painting.

Music.—Full courses in vocal and instrumental music, including piano, organ, and violin, are offered. As in the case of drawing and painting, students may pursue the study of music by itself.

Physical Training.—A special gymnasium is set apart for the young women, and physical training, under a competent instructor, is a part of the regularly accredited work of the University.

Social Advantages.—Educational training in the conventionalities is provided for in a practical way by the numerous social gatherings.

ACCREDITED HIGH SCHOOL WORK

When a high school does approved work in some or all of the subjects required for admission to the University its graduates are excused from entrance examinations in such subjects, and the school is said to be accredited in those subjects. The University employs a high school visitor, whose business it is to inspect the high schools of the state. When his report on a school is favorable, and is approved by the accredited school committee and the Faculty, the school is accredited for the subjects which he recommends. The University bears the expense of such inspection, but does not send the visitor to any school whose report does not make it evident that the school is doing work, in quantity and quality, worthy of the time and attention of the University. The University accredits *all work which is sufficiently well done. The following schools are, therefore, not accredited for the same amount and kind of work.* In all subjects other than those for which his school is accredited, which are required for admission to the department of the University that he desires to enter, the student must pass an examination, or take the work in the Preparatory School of the University.

LIST OF ACCREDITED SCHOOLS

School	Superintendent	Principal
Aledo	P. J. Kuntz	F. M. Hollembaek
Alton	R. A. Haight	J. E. Turner
Amboy	F. W. Dunlap	F. W. Dunlap
Arcola	G. W. Smith	Maud E. Bristol
Atlanta	Henry H. Edmunds	Fay M. Hopkins
Augusta	H. M. Anderson	H. M. Anderson
Aurora (East)	C. M. Bardwell	Wm. J. Pringle

School	Superintendent	Principal
Aurora (West)	A. V. Greenman	Katherine Reynolds
Austin	N. D. Gilbert	B. F. Buck
Batavia (East)	W. E. King	Ruth Wardall
Batavia (West)	T. C. Frye	I. B. Hunter
Beardstown	S. Sterrett Beggs	H. J. Jockisch
Belleville	H. D. Updike	H. W. Brua
Belvidere (North)	Arthur J. Snyder	Flora Fellows
Belvidere (South)	Montgomery Moore	Carrie A. Longley
Bement	Charles McIntosh	Willard N. Tobie
Bloomington	E. M. VanPetten	E. L. Boyer
Blue Island (Township High School)		J. E. Lemon
Burlington, Ia.	Charles E. Shelton	E. Boppe
Cairo	T. C. Clendenen	John Snyder
Camp Point	C. P. Beale	C. P. Beale
Canton	Charles S. Aldrich	Charles S. Aldrich
Carlinville	Edwin H. Owen	Edwin H. Owen
Carrollton	Clyde Slone	Clyde Slone
Carthage	W. K. Hill	W. K. Hill
Centralia	Irwin F. Mather	Ellen Sherman
Champaign	Joseph Carter	Lottie Switzer
Charleston	W. T. Gooden	William Wallis
Chicago—		
Calumet	Albert G. Lane	A. S. Hall
Englewood	“	J. E. Armstrong
English High and Manual Training	“	A. R. Robinson
Hyde Park	“	C. W. French
Jefferson	“	Charles A. Cook
Lake	“	Edward F. Stearns
Lake View	“	James H. Norton
Marshall	“	Louis J. Block
Medill	“	S. B. Sabin
North Division	“	O. S. Wescott
Northwest Div.	“	Franklin P. Fisk
South Division	“	Jeremiah Slocum
South Chicago	“	Charles I. Parker
West Division	“	George M. Clayberg
Chicago Manual Training, H. H. Belfield,		Director.
Chrisman	S. C. Clark	Cora Reno
Clinton	J. W. Hesler	Minnie Bishop

School	Superintendent	Principal
Clinton, Ia.	O. P. Bostwick	E. L. Mason
Cobden	A. L. Bliss	A. L. Bliss
Danville	J. E. Bryan	B. D. Billinghurst
Davenport, Ia.	J. B. Young	H. H. Roberts
Decatur	E. A. Gastman	Frank Hamsher
Delavan	F. L. Calkins	Stella I. Hoghton
Dixon (North)	E. C. Smith	Lydia Williamson
Dixon (South)	Charles W. Groves	Benjamin F. Bullard
Dubuque, Ia.	F. T. Oldt	F. L. Smart
Dundee	S. M. Abbott	S. M. Abbott
DuQuoin	David B. Rawlins	Charles E. Knapp
Dwight	G. W. Horton	Leila Britt
East St. Louis	John Richeson	John Richeson
Edwardsville	J. M. Parkinson	M. D. Cox
Effingham	C. V. McReynolds	Miss E. C. Finley
Elgin	M. A. Whitney	Eugene C. Peirce
Elmwood	L. E. Flanegin	Jeannette C. Munson
El Paso (West)	R. E. Worley	R. E. Worley
Evanston (Township High School)		Henry L. Boltwood
Evansville, Ind.	W. A. Hester	Robert Spear
Farmer City	C. C. Covey	C. C. Covey
Farmington	H. L. Roberts	Elizabeth Williams
Flora	J. L. Hughes	Philo S. Stevenson
Freeport	R. S. Page	S. E. Raines
Fulton	A. Ebersole	Mary O. Conrath
Galena	Joel A. Harley	C. E. Smith
Galesburg	Wm. L. Steele	F. D. Thomson
Galva	F. U. White	Hedwig M. Maul
Geneseo	A. W. Hussey	Emma Roane
Gibson City	R. G. Jones	Samuel L. Garvin
Grand Prairie Seminary (Onarga)		S. VanPelt
Greenfield	Horace G. Russell	Horace G. Russell
Griggsville	H. C. McCairel	Nora Simmons
Harvard	John S. Brazier	Anna M. Morrow
Harvey	F. L. Miller	J. E. Cable
Henry	Wm. Calhoun	Sue McMurtry
Hillsboro	Josiah Bixler	Mattie Hunt
Hinsdale	J. M. Frost	Grace E. Germain
Hoopeston	S. A. D. Harry	B. E. Ford
Jacksonville	J. W. Henninger	Hugh S. Weston

School	Superintendent	Principal
Jerseyville	J. Pike	Edward B. Shafer
Joliet	Mrs. K. A. Henderson	J. Stanley Brown
Kankakee	F. N. Tracy	Eugene C. Crosby
Keokuk, Ia.	O. W. Meyer	George E. Marshall
Kewanee	A. C. Butler	H. S. Latham
Lacon	Frank H. Wescott	Isabelle Baird
La Grange	(Township High School)	E. G. Cooley
Lanark	E. S. Hady	Louise C. Winner
LeRoy	B. C. Moore	Bertha Rutledge
Lewistown	Burton E. Nelson	Hattie M. Wasmuth
Lexington	Jesse L. Smith	Jesse L. Smith
Lincoln	F. M. Richardson	Jane Kidd
Litchfield (North)	(Township High School)	J. E. Wooters
Lockport	J. E. Hooton	Augusta Rudd
Macomb	R. C. Rennick	J. W. Hays
Marengo	John E. Nelson	A. M. McDermott
Mason City	C. O. DuBois	Mrs. E. A. Naylor
Mattoon	B. F. Armitage	E. Kate Carman
Maywood	J. Porter Adams	H. A. Owen
Mendota (East)	W. R. Foster	Lillian Purkhiser
Mendota (West)	S. E. Beede	Myra J. Howes
Moline	H. M. Slauson	W. J. Cox
Monmouth	J. C. Burns	W. D. McDowell
Morrison	M. M. Warner	Mrs. P. F. Burtch
Mound City	J. M. McKinney	J. M. McKinney
Mt. Carmel	D. W. Gamble	Kate Marsh
Mt. Carroll	J. M. McCallie	Ada M. Griggs
Murphysboro	Charles W. Parkinson	Ellis H. Rogers
Nashville	J. B. Bundy	A. B. Wight
Newton	E. B. Brooks	Electa Ransom
Normal	E. A. Fritter	T. M. Birney
Oak Park	W. H. Hatch	D. O. Barto
Oregon	W. J. Sutherland	Adalaide Steele
Ottawa	(Township High School)	J. O. Leslie
Paris	J. D. Shoop	J. D. Shoop
Paxton	O. J. Bainum	J. E. McKown
Pekin	Orren A. Schotts	Josephine Goodheart
Peoria	Newton C. Dougherty	Alfred W. Beasley
Pittsfield	W. R. Hatfield	Caroline Grote
Polo	I. M. Bridgman	Mrs. I. M. Bridgman

School	Superintendent	Principal
Pontiac	(Township High School)	J. E. Bangs
Princeton	(Township High School)	W. A. Pratt
Quincy	Alfred A. Seehorn	Wm. F. Geiger
Ridge Farm	H. H. Kidd	Mrs. Jessie Fletcher
Rochelle	C. F. Philbrook	Mollie V. Hodgman
Rockford	P. R. Walker	B. D. Parker
Rock Island	R. G. Young	E. V. Robinson
Roodhouse	P. M. Silloway	Wm. Skinner
Rossville	I. A. Smothers	Clarence N. Boord
Rushville	Nathan T. Veatch	Nathan T. Veatch
Salem	D. B. Fager	Laura Myers
Sandwich	W. W. Woodbury	Alice E. Blanchard
Savanna	W. S. Wallace	Florence Chowning
Shelbyville	Thomas A. Hillyer	Jennie Good
Southern Collegiate Institute (Albion)		Frank B. Hines
Sparta	S. B. Hood	J. M. Nickles
Springfield	J. H. Collins	Wm. Helmle
Sterling (3d Dis't)	H. L. Chaplin	Anna Parmelee
Sterling (Wallace)	S. B. Hursh	Harriet B. Esterly
Streator	(Township High School)	Alfred Bayliss
Sullivan	J. M. Martin	I. N. Biebinger
Taylorville	(Township High School)	William E. Andrews
Terre Haute, Ind.	Wm. Wiley	Charles Meek
Tuscola	Charles S. Earle	Charles Ammerman
Urbana	J. W. Hays	H. T. Willson
Vienna	M. N. McCartney	M. N. McCartney
Virden	E. A. MacMillan	C. M. Brennen
Virginia	Benjamin H. Scudder	Lydia G. Clark
Warren	M. C. Ladd	O. M. Buser
Washington	H. W. Veach	H. W. Veach
Waukegan	C. Victor Campbell	Emily M. Coon
Western Military Academy (Upper Alton)		A. M. Jackson
Wheaton	J. B. Russell	H. O. Staufft
Wilmington	F. M. Crosby	Helen Buss
Winchester	I. M. Jeffords	Hattie Hulick
Woodstock	C. W. Hart	Mrs. Etta Beach
Wyoming	J. M. Hutchinson	Myra N. Manning.
Yorkville	Richard Heyward	Jennie M. Price

MILITARY SCIENCE

The military instruction is under the charge of a graduate of the U. S. Military Academy and officer of the regular army of the United States. The course as a whole has special reference to the duties of officers of the line. A full supply of arms and ammunition is furnished by the War Department, including 300 cadet rifles and accoutrements, and two field pieces of artillery.

Every male student, able to perform military duty, and not excused for sufficient cause, is required to drill twice each week until he has gained six creditable term-records. He is also required to study Drill Regulations for Infantry and to recite upon the same once a week until he passes two creditable term-examinations. This practical instruction begins as soon as possible after he enters the University; but a preparatory student carrying no freshman studies and not expecting to matriculate during the year, is not permitted to drill. The standings in study and drill are placed on record, with other class credits; two terms of recitations and drill count one credit, and the four remaining terms of drill another, and are requisite to graduation in every University course.

Appointments in the battalion are made on nomination by the professor in charge and confirmation by the Faculty.

Students who have passed two examinations in the drill regulations and who have gained two term-credits in drill practice are eligible for corporals; those having three term-credits in each are eligible for sergeants, and those having six term-credits in each, for lieutenants and for officers of higher rank.

The battalion (four companies) is composed mainly of the members of the freshman and sophomore classes, the first supplying the corporals, the second, the sergeants. The lieutenants are taken from those of the junior class, and the major and captains from those of the senior class, who have passed through the lower grades satisfactorily.

A special military scholarship, good for one year, is open to each student who attains the grade of a commissioned officer, the value of which is paid the holder at the close of the year.

An artillery detachment is organized mainly from the second year, or sophomore, class, which receives practical instruction twice each week during the college year.

Toward the close of the spring term, a committee appointed by the Faculty examines candidates for nomination to the Governor of the state to receive commissions as brevet captains in the state militia. Candidates must be members of the senior class in full standing at the time of this examination; must have completed the course of military studies; must have served three terms as captains or lieutenants, and must be approved by the Faculty as having good reputations as scholars, officers, and gentlemen.

Under the authority of the acts of incorporation, the Trustees have prescribed a uniform of cadet gray, coat trimmed with black mohair braid, trousers with black cloth stripe, cut after the U. S. army pattern. The uniform of the cadet officers is of dark blue cloth for coat and light blue for trousers; cap, for all, of dark blue cloth, army pattern, with university badge embroidered thereon in gold bullion; white gloves; the uniform of the band dark blue throughout, with special trimmings.

In order that all uniforms worn at this University may be, in quality, make, and finish in strict accordance with the specifications adopted by the Board of Trustees, all students enrolled in the military department will be required to obtain them from that firm only that may, for the time being, be under agreement and bond with the Trustees to furnish said uniforms at a stated price and of standard quality.

The University Cornet Band is composed of students, and every full term of service therein is counted as one term of drill.

PHYSICAL TRAINING

The object of the department of physical training is to teach and put into practice the best methods of preserving health, of gaining physical vigor, of correcting imperfect development, and of avoiding injury and disease. Certificates of the proper examiner are required for membership in the athletic teams.

Men and women have their practice and much of their instruction separately in physical training, but all students have equal consideration in the provisions made for the work and in the freedom of choice under the necessary regulations.

FOR MEN

The new gymnasium, located in the building formerly occupied by the engineering laboratory, is equipped with the latest appliances. There is an unobstructed floor space of 61 by 121 feet. The building contains shower baths, needle bath, tub bath, lavatories, lecture room, and directors' offices. The gymnasium is open from 9 a. m. to 4 p. m. The adjoining Illinois Field serves well for games and for track purposes, and here take place all the intercollegiate contests.

FOR WOMEN

Each student who takes physical instruction is expected to undergo a physical examination every year, in order that her physical condition may be known and suitable exercises and advice given. Systematic class work is given in the use of dumb-bells, wands, bar-bells, foils, Indian clubs, and on many pieces of gymnastic apparatus.

During the fall and spring terms, out-door games and exercises receive considerable attention. Lectures and talks on hygiene, physical training, etc., are given during the winter term.

Special attention is given to the correction of those inequalities of hips, shoulders, and vertebræ which prevent the

harmonious development of the body. Each student comes under the personal observation of the director and is given exercises to meet her special needs.

Every woman student not physically disqualified must take the prescribed work and may elect enough to make two credits.

The women's gymnasium occupies very attractive quarters in Natural History Hall, and is well equipped. The pastime grounds near by, in use through the year, when the weather permits, have a sixteen-lap running track, eight tennis courts, two basket ball fields, and space for hurdling, handball, and other suitable amusements.

The gymnasium is open for exercise, at certain hours, under suitable restrictions, to those who are not enrolled in classes.

ANTHROPOMETRY

Considerable time and attention is given to this work. Careful anthropometrical examinations are made as to the particular needs of the students, and on the basis of the information thus gained suitable exercises are prescribed; various strength tests and measurements are taken; the heart, lungs, and eyes are examined, and special attention is given to those who do not reach the normal in strength or in bodily development.

EXPENSES

BOARD

The University does not furnish board, but there is a large number of suitable private places in Urbana and Champaign, within walking distance of the University, and easily accessible by electric railway, where students can obtain table board and rooms. There are several students' clubs at which the cost of meals is about two and a half dollars a week.

The Business Manager and the Young Men's and Young Women's Christian Associations of the University will aid new students in procuring rooms and boarding places.

FEES

The TUITION IS FREE in all the University classes for matriculated students.

THE MATRICULATION FEE entitles the student to membership in the University until he completes his studies, and is...$10 00

THE DIPLOMA FEE, payable before graduation, is........... 5 00

THE TERM FEE, for incidental expenses, is, for each student, except in Graduate School........................... 7 50

THE TUITION FEE, for all special students (except in music), and for pupils of the Preparatory School, per term, is... 5 00

MUSIC FEES.—Students enrolled in the department of music only, pay no matriculation fee or term fee. They must, however, pay the following music fees:

	FIRST TERM	SECOND TERM	THIRD TERM
Piano, Organ, or Voice............ (Two lessons a week.)	$25 00	$20 00	$20 00
Piano, Organ, or Voice........... (One lesson a week.)	15 00	12 00	12 00
Violin or other stringed instrument. (Two lessons a week.)	21 00	16 00	16 00
Violin or other stringed instrument. (One lesson a week.)	11 00	9 00	9 00

Harmony, counterpoint, fugue, etc., in classes not to exceed four, $6.00 per term.

Students enrolled in any other department of the University and paying fees therein, may enter the department of music on payment of the following fees:

	FIRST TERM	SECOND TERM	THIRD TERM
Piano, Organ, or Voice.......... (Two lessons a week.)	$20 00	$15 00	$15 00
Piano, Organ, or Voice.......... (One lesson a week.)	12 00	9 00	9 00
Violin or other stringed instrument. (Two lessons a week.)	16 00	11 00	11 00
Violin or other stringed instrument. (One lesson a week.)	9 00	6 00	6 00

No deduction is made on account of absence in any course, except in case of protracted illness.

Students can rent pianos for practice by applying to the head of the music department.

LABORATORY FEES.—Each student working in laboratories, or in the drafting or engineering classes, is required to make a deposit varying from 50 cents to $10, to pay for chemicals and apparatus used, and for any breakages or damages.

LIBRARY SCHOOL FEES.—Estimated expenses of visits of inspection to Chicago libraries, $25.00.

Deposit Fund for Library School supplies: $20.00 junior year; $10.00 senior year.

ALL BILLS due the University *must be paid within ten days after the student enters classes.*

NECESSARY EXPENSES

The following are estimated minimum and maximum annual expenses, exclusive of books, clothing, railroad fare, laboratory fees, if any, and small miscellaneous needs:

Term fees......	$ 22 50	$ 22 50
Room rent for each student (two in a room)......	22 50	50 00
Table board in boarding houses and clubs........	90 00	126 00
Fuel and light..............................	10 00	15 00
Washing	12 00	18 00
Total	$157 00	$231 50
Board and room in private houses, per week......	4 00	6 00

CAUTION TO PARENTS—STUDENTS' FUNDS

The Business Manager will receive on deposit any funds parents may intrust to him to meet the expenses of their sons and daughters. *No greater error can be committed than to send young people from home with large amounts of spending money,* without the authoritative care of some prudent friend. Half the dissipation in colleges springs from excessive allowances of money.

LAW SCHOOL FEES are—

Matriculation fee, paid once..........................$10.00

	FALL TERM.	WINTER TERM.	SPRING TERM.
Tuition	$25.00	$15.00	$10.00

SCHOOL OF MEDICINE FEES are—

Matriculation fee, paid each year................$ 5.00
General ticket, each year........................ 105.00

Winter Term—

Laboratory Deposit (for material and breakages, balance returned)..........................$25.00
Matriculation fee, good for the year............. 5.00

Spring Term—

General ticket.................................. 20.00
Laboratory deposit.............................. 10.00

SCHOOL OF PHARMACY FEES are—

Tuition fee, each year.......................... 75.00
Laboratory deposit each year.................... 5.00

PREPARATORY SCHOOL

INSTRUCTORS

EDWARD G. HOWE, B. S., Principal, Natural Science.
LILLIE ADELLE CLENDENIN, English.
REUBEN S DOUGLASS, A. B., Geometry and Physics.
CHARLES B. RANDOLPH, A. B., Latin and Greek.
CLARENCE W. ALVORD, A. B., History and Algebra.

This school offers special advantages to young men and women who, on account of advanced age or prolonged absence from school, are out of touch with the high school.

ADMISSION

Candidates for admission must be at least fifteen years of age. Those of age may enter such classes as they are prepared for without examination. All under twenty-one years of age must pass a satisfactory examination in the following subjects:

1. ARITHMETIC.—A thorough knowledge is required of fundamental operations, simple and denominate numbers, the metric system of weights and measures, common and decimal fractions, practical measurements, percentage, ratio and proportion.

2. ENGLISH.—The examination is intended to test the student's vocabulary, and his knowledge of grammar.

3. GEOGRAPHY.—An accurate knowledge of elementary physical and political geography is required.

4. HISTORY.—As a foundation in this subject, a knowledge of the early settlement of North America and of the growth and development of the United States, is required. A knowledge of

the nature and operation of the forces active in American life is desired, rather than the memorization of isolated dates and names.

ENTRANCE should be made at the opening of the term. Examinations are held in the rooms of the school. For the fall term, 1898, these examinations occur on Thursday, Friday, and Saturday, the 8th, 9th, and 10th of September; for the winter and spring terms, on the two days previous to the opening of each term. Examinations on these dates are free, but for examinations at other times a fee of three dollars is charged.

EXAMINATIONS may be conducted in Illinois by county superintendents of schools in the same manner as for teachers' certificates, and their favorable reports will be accepted for entrance. First or second grade teachers' certificates from superintendents of Illinois will be taken for the same purpose.

On the written recommendation of their principals, students from the accredited schools of the University may be admitted without entrance examinations and credit will be allowed for all equivalent work already done. Blanks for such recommendations will be sent on application.

COURSE OF STUDY

The time necessary for the completion of the course offered is not fixed, but depends on the ability and previous training of the student. Applicants will be admitted at any time on presenting proof that they are prepared to pursue the selected subjects. Preparatory students generally carry four studies, one of which should be such as needs but little work outside of the class room. The number varies, however, with the ability of the student and the nature of the course.

The following schedule gives the subjects in which instruction can be had and the term or terms in which they are taught:

		FALL TERM	WINTER TERM	SPRING TERM
1	Algebra...... *	Through two unknown quantities.	To quadratics.	Completed.
2	Botany............		Last half of the year.	
3	English, 1, 2, 3.....	Grammar, composition, and reading.	Rhetoric, composition, and reading.	Rhetoric, composition, and reading.
4	English, 4, 5, 6......	Literature, themes, and reading.	Literature, themes, and reading.	Literature, themes, and reading.
5	Drawing............	Any one term.		
6	French............	Two years.		
7	German............	Two years.		
8	Geometry, plane...	5 books.	1st and 2d books. †	3d, 4th, and 5th † books.
9	Geometry, solid....	All. †	All.	All †
10	Greek, 1st year	Grammar and readings.	Grammar and readings.	Grammar, Anabasis and composition
11	Greek, 2d year.....	Anabasis and composition.	Grammar, Hellenica and composition.	Gram., Herodotus, and composition.
12	History	England.	England and America.	America and civil government.
13	Latin, 1st year.....	Grammar, readings, and composition.	Grammar, readings and composition.	Cæsar.
14	Latin, 2d year.....	Cæsar.	Sallust.	Cicero.
15	Latin, 3d year.....	Cicero.	Cicero and Vergil.	Vergil.
16	Physics		Magnetism, elect'y mensuration, heat.	Mechanics, sound and light.
17	Physiology.........	Fall term.		
18	Zoology............	One-half year.		

Students must choose from the above list such studies as they require for their chosen courses in the University.

COURSES OF INSTRUCTION

ALGEBRA

Rapidity and accuracy in all operations is rigidly required. Special emphasis is laid upon the use of purely literal expressions, radicals, fractional, and negative exponents, and upon the fundamental nature of the equation. *Text, Wentworth's Higher Algebra.*

* If 5 or more apply, a class will *review* the entire subject in the fall term or *begin* in the winter term.

† If 5 or more apply.

By terms, the work is divided as follows:

1. Fundamental processes, factoring, divisors, and multiples, fractions, and simple equations with one or more unknown quantities.

2. Involution and evolution, theory of exponents, radicals, and quadratic equations.

3. Theory of quadratic equations, inequalities, theory of limits, ratio and proportion, variation and the progressions.

BOTANY

This is a study of plants rather than of books about plants, although books are not disregarded. It is an introduction to the science, and is intended to give an acquaintance with the chief features of the subject. The analysis of simple flowers and the preparation of a small herbarium of correctly named and properly mounted plants is required. *Bergen's Elements of Botany.*

ENGLISH

The subject is presented in such a way as to increase the student's vocabulary and to develop elegance and exactness of expression in his composition. Advanced grammar and rhetoric are taught in connection with this work. The study of literary masterpieces is also pursued to furnish material for the weekly written exercises, and to cultivate a taste for good literature. Considerable collateral reading in English and American authors is therefore required.

FREE-HAND DRAWING

This subject is best taken in the first term in order that pupils may have the benefit of its training in the studies which follow. *Frederick's Notes on Free-Hand Drawing.*

FRENCH AND GERMAN

Students in the Preparatory School take the work of the regular University German and French classes.

GEOMETRY

Special attention is paid to the development of the idea of mathematical demonstration; and, as many students who can reason logically cannot express their ideas clearly, due attention is paid to correctness of form. As soon as the student has attained the art of rigorous demonstration he is required to produce constructions and demonstrations for himself. Considerable attention is devoted to original work. *Wentworth's Plane and Solid Geometry.*

GREEK

The study of this subject should, when possible, be preceded by at least one year of Latin.

HISTORY

Instruction in this subject is confined to English and American history. A detailed study of the rise and progress of the English-speaking people in England and America is made, and considerable attention is given to the origin and development of representative government. The work extends through one year; one-half of the time is devoted to English, and the other half to American history.

The work, by terms, is as follows:

1. English History through the Revolution of 1688. *Green's Shorter History of English People.*

2. English History from 1688 to the present time, and American History to the Revolutionary War. *Fiske's History of the United States.*

3. American History from the Revolutionary War to the present time.

LATIN

The ground covered consists of the grammar and selections from Cæsar, Sallust, Cicero, and Vergil. Translation of English into Latin is made a prominent part of the work, and in connection with the Vergil the scansion of hexameter verse and matters of historical and mythological interest are studied. The Roman method of pronunciation is used, with special attention to quantity.

PHYSICS

This study is so presented as to cultivate habits of careful observation, and to develop in the student the ability to reach general conclusions inductively by means of exact experiment. In all laboratory work the student is required to keep a notebook containing a complete record of experiments performed.

PHYSICAL TRAINING

Preparatory students can now have the benefit of a thorough physical examination and regular exercise, under the guidance of University instructors. This will be required of all, under the same regulations as for University students.

Those suffering from serious physical defects may be excused on the written advice of the Physical Director, and those who are working for self-support may be excused for the period so engaged.

PHYSIOLOGY

In this subject the book used is illustrated by the use of charts, skeleton, and manikin, and by a series of laboratory experiments.

ZOÖLOGY

Through the study of typical animals the subject is so presented as to lead the student to a knowledge of methods of scientific classification in the natural sciences, and to prepare for the more advanced work of the University. Orton's Zoölogy and collateral reading.

REGULATIONS

Reports regarding all non-resident and minor students (and, upon request, regarding any others) are sent to parents or guardians as soon as students are settled in their work, and reports regarding all students are sent at the close of each term.

The calendar of the Preparatory School is the same as that of the University.

For information concerning fees and expenses, see page 264.

For special information with regard to the Preparatory School, address Edward G. Howe, Urbana, Illinois.

LIST OF STUDENTS

TECHNOLOGICAL, SCIENTIFIC, AGRICULTURAL AND LITERARY DEPARTMENTS

*GRADUATE SCHOOL

Adams, Charles Christopher, B.S., (*Illinois Wesleyan Univ.*), *Urbana*, Natural Science.

†Barber, Ella Ursula, B.L., (*Univ. of Ill.*), *Chicago*, English and History.

†Barclay, Thomas, B.S., (*Univ. of Ill.*), *Aurora*, Smelting and Refining Processes of the United States; Geology of Ore Deposits.

Beadle, Thomas B., B.S., (*Univ. of Ill.*), *Kewanee*, Chemistry.

†Beebe, Charles David, B.S., (*Univ. of Ill.*), *Evanston*, Mechanical Engineering.

Boggs, Cassandra Armstrong, B.L., (*Univ. of Ill.*), *Urbana*, English and Pedagogy.

Boon, William Guthrie, B.S., (*Univ. of Ill.*), *Armstrong*, Civil Engineering.

Brenke, William Charles, B.S., (*Univ. of Ill.*), *Champaign*, Mathematics and Astronomy.

†Brown, Walter Burrows, B.S., (*Univ. of Ill.*), *Buffalo, N. Y.*, Chemistry.

Burnham, Alton Cyrel, B.S., (*Mich. Agri. Coll.*), *Urbana*, Mechanical Engineering.

†Burt, Henry Jackson, B.S., (*Univ. of Ill.*), *New Orleans, La.*, Civil Engineering.

†Busey, Frank Lyman, B.S., (*Univ. of Ill.*), *Urbana*, Mechanical Engineering.

Carnahan, David Hobart, A.B., (*Univ. of Ill.*), Fellow, *Champaign*, French.

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*Each student of the Graduate School is a candidate for a Master's or a Doctor's degree.

†*In absentia*, see p. 243.

Carpenter, Hubert Vinton, B.S., (*Univ. of Ill.*), *Champaign,* Electrical Engineering.

*Clarke, Edwin Besançon, B.S., *(Univ. of Ill.), Chicago,* Architecture.

*Cole, Edward E., B.S., *(Univ. of Ill.), Pueblo, Colo.,* Economics and History.

Dewey, James Ansel, B.S., (*Univ. of Ill.*), *Urbana,* Natural Science.

Dewey, Louise Sarah, B.S., (*Univ. of Ill.*), *Urbana,* Natural Science.

Foote, Ferdinand John, B.S., (*Univ. of Ill.*), *Champaign,* Electrical Engineering.

Fraser, Wilber John, B.S., (*Univ. of Ill.*), *Champaign,* Agriculture.

*Frederick, Grant, B.L., *(Univ. of Ill.), Paxton,* Economics.

*Garber, John Frederick, A.B., *(Univ. of Ill.), Flora,* Pedagogy.

*Gardner, Frank Duane, B.S., *(Univ. of Ill.), Washington, D. C.,* Agriculture.

*Garnett, Charles Hunter, A.B., *(Univ. of Ill.), Chicago,* Economics and History.

*Goodenough, George Alfred, B.S., (*Mich. Agri. Coll.*), *Scranton, Pa.,* Mechanical Engineering.

*Gregory, Alfred, A.B., (*Univ. of Ill.*), *Kansas City, Mo.,* Economics.

*Gulick, Edward Everett, B.L., *(Univ. of Ill.), Champaign,* History.

*Hallinen, Joseph Edward, B.S., (*Univ. of Ill.*), *Ottawa,* Zoölogy and Pedagogy.

*Harris, James Waldo, B.S., (*Univ. of Ill.*), *Baraboo, Wis.,* Civil Engineering.

Heller, Opal, B.L., (*Univ. of Ill.*), *Urbana,* English and Pedagogy.

*Hempel, Adolph, B.S., *(Univ. of Ill.), São-Paulo, Brazil,* Protozoa and Rotifera; Literature of Biological Station Methods and Investigations.

Hobart, Albert Claude, B.S., (*Univ. of Ill.*), Fellow, *Elgin,* Civil Engineering.

*Honens, Fred William, B.S., (*Univ. of Ill.*), *Milan,* Civil Engineering.

Hubbard, George David, B.S., (*Univ. of Ill.*), *Urbana,* Paleontology, Zoölogy, and Entomology.

*Kendall, William Finley, B.S., (*Univ. of Ill.*), *Del Rio, Texas,* Civil Engineering.

*Kerns, Shirley Kendric, A.B., (*Univ. of Ill.*), *Champaign,* English and Modern Language.

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* *In absentia,* see p. 243.

*Ketchum, Milo Smith, B.S., (*Univ. of Ill.*), *Butte, Mont.*, Civil Engineering.

Ketchum, Richard Bird, B.S., (*Univ. of Ill.*), *Urbana*, Civil Engineering.

Kyle, Martha Jackson, A.B., (*Univ. of Ill.*), *Urbana*, English and Modern Languages.

*Linn, Homer Roberts, B.S., (*Univ. of Ill.*), *Cleveland, O.*, Mechanical Engineering.

*McCormack, Harry, B.S., (*Drake Univ.*), *Des Moines, Ia.*, Chemistry.

McKee, James Harry, B.S., (*Univ. of Ill.*), *Urbana*, Mechanical Engineering.

*Martin, John Madison, A.B., (*Univ. of Ill.*), *Sullivan*, Pedagogy, Sociology, and Psychology.

Millar, Adam Vause, B.S., (*Univ. of Ill.*), *Mattoon*, Mathematics and Astronomy.

*Milne, Edward Lawrence, B.S., (*Univ. of Ill.*), *Champaign*, Mathematics and Astronomy.

Myers, James William, A.B., (*Univ. of Ill.*), *Urbana*, History.

Paul, Arthur Ernest, B.S., (*Univ. of Ill.*), Fellow, *Chicago*, Chemistry.

Poole, Edward Warren, B.S., (*Univ. of Ill.*), Fellow, *Dover*, Electrical Engineering.

*Richart, Frederick William, B.S., (*Univ. of Ill.*), *Fredonia*, Mechanical Engineering.

Sager, Fred Anson, B.S., (*Univ. of Mich.*), *Urbana*, Mathematics and Physics.

Sammis, John Langley, B.S., (*Univ. of Ill.*), *Jacksonville*, Chemistry.

*Sayers, Albert Jefferson, B.S., (*Univ. of Ill.*), *Chicago*, Mechanical Engineering.

Schacht, Frederick William, B.S., (*Univ. of Ill.*), Fellow, *Moline*, Natural Science.

*Shepardson, John Eaton, B.S., (*Univ. of Ill.*), *Aurora*, Civil Engineering.

Smith, Louie Henrie, B.S., (*Univ. of Ill.*), *Crystal Lake*, Chemistry.

Spurgin, William Grant, A.B., (*Univ. of Ill.*), *Urbana*, Classical.

Stickles, Arndt Matthew, A.B., (*Ind. State Univ.*), *Patricksburg, Ind.*, History, Pedagogy, and Economics.

Sweney, Don, B.S., (*Univ. of Ill.*), Fellow, *Gettysburg, Pa.*, Mechanical Engineering.

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* *In absentia*, see p. 243.

*Sy, Albert Philip, B.S., (*Univ. of Ill.*), *Chicago*, Chemistry.
Teeple, Wallace Douglas, B.S., (*Univ. of Ill.*), *Marengo*, Architecture.
Webber, Hubert Anthony, B.S., (*Univ. of Ill.*), *Champaign*, Architecture.
Zimmerman, Walter Howard, B.S., (*Univ. of Ill.*), *Champaign*, Mechanical Engineering.

†RESIDENT GRADUATES

Arnold, Mary Edna, Ph.D., (*Univ. of Indianapolis*), *Souders*, Art and Design.
Christner, Fred Wallace, B.S., (*Doane Coll.*), *Crete, Neb.*, Library.
Edwards, Grace Osborne, B.S., (*Wellesley Coll.*), *LaCrosse, Wis.*. Library.
Hopkins, Mrs. Emma, B.S., (*Univ. of S. Dak.*), *Urbana*, Music.
Miner, Ralph Scott, M.S., (*Knox Coll.*), *Table Grove*, Natural Science.
Orme, Hence Irwin, A.B., (*Ind. State Univ.*), *Glenns Valley, Ind.*, General L. and A.
Parker, Phebe, A.B., (*Univ. of Mich.*), *Norwalk, Ohio*, Library.
Porter, Horace Chamberlain, A.B., (*Univ. of Ill.*), *Champaign*, Chemistry.
Rundle, Frank, A.B., (*Hanover Coll.*), *Clinton*, Civil Engineering.
Shawhan, Gertrude, B.L., (*Univ. of Ill.*), *Champaign*, Library.
Smith, Leo Clark, A.B., (*Neb. State Univ.*), *Council Bluffs, Ia.*, Library.
Sparks, Marion Emeline, A.B., (*Univ. of Ill.*), *Urbana*, Library.
Tibbitts, Carrie Sarah, A.B., (*Hiram Coll.*), *Cleveland, Ohio*, Library.
Waters, Willard Otis, A.B., (*Benzonia Coll.*), *Benzonia, Mich.*, Library.
Winston, Charles Sumner, A.B., (*Univ. of Chicago*), *Chicago*, Electrical Engineering.
Wright, Wilber Hoyt, A.B., (*Univ. of Ill.*), *Normal*, Natural Science.

* *In absentia*, see p. 243.

† Students in this list are not candidates for higher degrees than they now hold.

SENIORS

[In the lists which follow "L. and A." stands for College of Literature and Arts; "S." for College of Science.]

Aaron, Philip Judy,	*Big Neck,*	Electrical Eng'g.
Anderson, Clark Godfrey,	*Moline,*	Civil Engineering.
Arnold, Jay Jennings,	*Springfield,*	Natural Science.
Beasley, D Edythe,	*Urbana,*	Classical.
Beem, Fred Clarkson,	*Ottawa,*	Architecture.
Berry, Erwin Howard,	*Paw Paw,*	Chemistry.
Black, William Wesley,	*Champaign,*	Philosophy, L. and A.
Breidert, Henry Cyrille,	*Havana,*	Civil Engineering.
Brockway, Edwin Ladue,	*Macomb,*	Electrical Eng'g.
Brower, Lyle Ireneus,	*Urbana,*	Architecture.
Byrne, Lee,	*Marshall, Minn.,*	Classical.
Chester, Guy Jacob,	*Champaign,*	Electrical Eng'g.
Clark, Charles Albert,	*Vandalia,*	Electrical Eng'g.
Clark, Charles Richard,	*Champaign,*	Architecture.
Clayton, Thomas Wiley,	*Dixon,*	Civil Engineering.
Coffeen, Harry Clay,	*Champaign,*	Math. and Astron.
Collins, Edgar Francis,	*Urbana,*	Electrical Eng'g.
Craig, Wallace,	*Chicago,*	Natural Science.
Crathorne, Arthur R,	*Champaign,*	Mathematics, L. and A.
Davison, Chester Morton,	*Rock Falls,*	Architecture.
Dickey, James Harvey,	*Urbana,*	Math. and Physics.
Dillon, William Wagner,	*Sheldon,*	General, L. and A.
Eckles, Harry Edward,	*New Castle, Penn.,*	Civil Engineering.
Enochs, Claude Douglass,	*Champaign,*	Electrical Eng'g.
Enochs, Delbert Riner,	*Champaign,*	Classical.
Everhart, Rollin Orlando,	*Carlinville,*	Political Science.
Fischer, Louis Englemann,	*Shiloh,*	Municipal Eng'g.
Forbes, Stuart Falconer,	*Urbana,*	Architecture.
Fox, Fred Gates,	*Peru,*	General, L. and A.
Frazey, Alice Belle,	*Urbana,*	General, L. and A.
Fullenwider, Arthur Edwin,	*Mechanicsburg,*	Architecture.
Fulton, William John,	*Hartford City, Ind.,*	Gen'l, L. and A.
Goodridge, Henry Anthony,	*Chicago,*	Electrical Eng'g.
Hair, Charles Ernest,	*Galesburg,*	Architecture.
Hall, Fred Silvey,	*Arcola,*	General, L. and A.
Hammers, Morgan J,	*Champaign,*	Mechanical Eng'g.
Hatch, Thomas Milford,	*Goshen, Ind.,*	Electrical Eng'g

Hays, Don,	*Sidney,*	Civil Engineering.
Hopper, Georgia Etherton,	*Champaign,*	General, L. and A.
House, Leone Pearl,	*Sadorus,*	Classical.
Hurd, Arthur Burton,	*El Paso,*	Electrical Eng'g.
Jordan, Helen,	*Tolono,*	Classical.
Kaeser, Albert Fred,	*Highland,*	Natural Science.
Koch, Fritz Conrad,	*Elmhurst,*	Chemistry.
Kofoid, Nellie Ione,	*Normal,*	Natural Science.
Lentz, Caroline,	*Arcola,*	Classical.
Linn, Francis David,	*Byron,*	Agriculture.
Linzee, Albert Carl,	*DuQuoin,*	Electrical Eng'g.
McCarty, Charles James,	*Rock Falls,*	Electrical Eng'g.
Marshutz, Joseph Hunter,	*Champaign,*	General, L. and A.
May, Harry Monroe,	*Rochelle,*	Electrical Eng'g.
Merker, Henry Fleury,	*Belleville,*	Electrical Eng'g.
Mesiroff, Josef,	*Chicago,*	Electrical Eng'g.
Mitchell, Frederick Alexander,	*Hillsboro,*	Mechanical Eng'g.
Morrow, Grace Eliot,	*Stillwater, Okla.,*	Natural Science.
Musham, John William,	*Chicago,*	Civil Engineering.
Naper, Herbert John,	*Chicago,*	Architectural Eng'g.
Neureuther, Andrew Henry,	*Peru,*	Mechanical Eng'g.
Nevins, John,	*Camp Point,*	Architecture.
Nickoley, Edward Frederick,	*Long Grove,*	Eng. and Modern Lang.
von Oven, Frederick William,	*Naperville,*	Civil Engineering.
Pease, Henry Mark,	*Malta,*	Electrical Eng'g.
Perkins, Reed Miles,	*Springfield,*	General, L. and A.
Polk, Cicero Justice,	*Champaign,*	General, L. and A.
Pooley, William Vipond,	*Galena,*	General, L. and A.
Ray, George Joseph,	*El Paso,*	Civil Engineering.
Rhodes, Ora M,	*Bloomington,*	Natural Science.
Robinson, Lewis Archibald,	*White Post, Va.,*	General, L. and A.
Ross, Herbert Austin,	*Jerseyville,*	Architectural Eng'g.
Saunders, Rome Clark,	*Champaign,*	Electrical Eng'g.
Shamel, Archibald Dixon,	*Taylorville,*	Agriculture.
Smith, Elmer Church,	*Columbus, Neb.,*	Civil Engineering.
Soper, Stanley Livingston,	*Garrison,*	Eng. and Modern Lang.
Staley, Joseph Clarence,	*Urbana,*	Classical.
Thayer, Albert Lewis,	*New Castle, Pa.,*	Architecture.
Thompson, Guy Andrew,	*Steward,*	General, L. and A.
Toenniges, Ferdinand Frederick Emil,	*Davenport, Ia.,*	Civil Eng'g.
Unzicker, William Luther,	*Hopedale,*	Classical.

Walker, Rufus, Jr.,	*Moline,*	General, L. and A.
Walter, Charles Albert,	*Sandwich,*	Chemistry.
Webster, Joshua Percy,	*Philadelphia, Pa.,*	Civil Engineering.
Webster, Sarah Emeline,	*Urbana,*	General, L. and A.
Weirick, Ralph Wilson,	*Washington,*	Architecture.
Wetzel, Clyde Leigh,	*Traer, Ia.,*	Electrical Eng'g.
Wharf, Allison James,	*Olney,*	Civil Engineering.
Williamson, Albert St. John,	*Quincy,*	Mechanical Eng'g.
Wilson, Frederick Henry,	*Evanston,*	Electrical Eng'g.
Wingard, Lewis Forney,	*Champaign,*	General, L. and A.
Wolcott, James Thompson,	*Peoria,*	Chemistry.
Woolsey, Lulu Catherine,	*Polo,*	Political Science.
Wray, David Couden,	*Elida,*	Civil Engineering.
Wuerffel, Herman Louis,	*Chicago,*	Electrical Eng'g.
Young, John Hayes,	*Chicago,*	Electrical Eng'g.

JUNIORS

Alarcó, Joseph Maria,	*Valencia, Spain,*	Electrical Eng'g.
Anderson, Harry,	*Sheldon,*	Electrical Eng'g.
Armstrong, Frank Hall,	*Serena,*	Mechanical Eng'g.
Bayard, Samuel Michael,	*Vincennes, Ind.,*	General, L. and A.
Bevans, Thomas Murray,	*Chicago,*	Electrical Eng'g.
Beckerleg, Gwavas Foster,	*Chicago,*	Civil Engineering.
Bennett, Ralph,	*Chicago,*	Electrical Eng'g.
Bennett, Ruth,	*Chicago,*	General, L. and A.
Bigelow, Mary C,	*Champaign,*	Math., L. and A.
Bradley, James Clifford,	*Morrison,*	Mechanical Eng'g.
Brown, Arthur Artemas,	*Urbana,*	Mechanical Eng'g.
Burkland, Theodore Leonard,	*Moline,*	Civil Engineering.
Burroughs, Elmer,	*Savoy,*	Electrical Eng'g.
Busey, Robert Oscar,	*Urbana,*	General, L. and A.
Campbell, Maude Permill,	*Champaign,*	Art and Design.
Carter, Henry Leslie,	*Girard,*	Math. and Physics.
Chase, Adelaide Maria,	*Chicago,*	Library.
Chipps, Halbert Lilly,	*Sullivan,*	Civil Engineering.
Church, Frank Wilson,	*Chicago,*	Architecture.
Chuse, Harry Arthur,	*Mattoon,*	Mechanical Eng'g.
Clark, Edith,	*Vandalia,*	General, L. and A.
Clark, Mary Edith,	*Champaign,*	Classical.
Clark, Philip Henry,	*Galena,*	General, L. and A.
Clifford, Charles Luther,	*Serena,*	Electrical Eng'g.

Cooke, Jane Elizabeth,	*Monroe, Mich.,*	Library.
Dill, William,	*Little Rock, Ark.,*	Architecture.
Dinwiddie, Virginia,	*Champaign,*	Natural Science.
Dodds, George,	*Neoga,*	Electrical Eng'g.
DuBois, Alexander Dawes,	*Springfield,*	Electrical Eng'g.
Eastman, Harry,	*Rock Island,*	Architecture.
Ely, Howard Montgomery,	*Peoria,*	Mechanical Eng'g.
Fairchild, Edna,	*Toledo, Ohio,*	Library.
Fleager, Clarence Earl,	*Sheldon,*	Electrical Eng'g.
Flesch, Eugene William Penn,	*Chicago,*	Architectural Eng'g.
Foberg, John Albert,	*Chicago,*	Math. and Physics.
Fowler, Robert Lambert,	*Charity,*	Civil Engineering.
Fraser, William Alexander,	*La Salle,*	Mechanical Eng'g.
Gallaher, Lewis Theron,	*Mt. Palatine,*	Natural Science.
Garver, Daisy,	*Bloomington,*	Classical.
Gerber, Winfred Dean,	*Rockford,*	Municipal Engineering.
Gilchrist, Hugh McWhurr,	*Gilchrist,*	Electrical Eng'g.
Ginzel, Roland Francis,	*Trenton,*	Architecture.
Goodman, Ella,	*Chicago,*	General, L. and A.
Graham, Archie James,	*Gallipolis, Ohio,*	Natural Science.
Graham, George Woods,	*Freeport,*	Civil Engineering.
Griffin, Walter B,	*Elmhurst,*	Architectural Eng'g.
Grim, Fred,	*Canton,*	Civil Engineering.
Hall, Louis Dixon,	*Hawarden, Ia.,*	Agriculture.
Harrower, John Charles,	*Barrington,*	Mechanical Eng'g.
Haseltine, Warren Edmund,	*Aurora,*	Chemistry.
Hawley, William Albert,	*Dundee,*	Civil Engineering.
Hazlitt, Albert Nichols,	*Ottawa,*	Architecture.
Herwig, John Newton,	*Mason City,*	Mechanical Eng'g.
Hill, Irwyn Horatio,	*Joliet,*	Architecture.
Hoagland, John King,	*Herborn,*	Agriculture.
Hubbard, George Wallace,	*Urbana,*	Mechanical Eng'g.
Hughston, Allie Dellena,	*Urbana,*	Natural Science.
James, Frederick Milton,	*Piasa,*	Natural Science.
Jones, Louise,	*Champaign,*	General, L. and A.
Jutton, Emma Reed,	*Champaign,*	Library.
Kable, James Franklin,	*Virden,*	Architectural Eng'g.
Ketchum, Daniel Clement,	*Champaign,*	Political Science.
Krahl, Benjamin Franklin,	*Aurora,*	Civil Engineering.
Krause, Louise Beerstecher,	*Chicago,*	Library.
Landel, Ida Susan,	*Paxton,*	Eng. and Modern Lang.

Latzer, John Albert,	*Highland,*	Agriculture.
Lawrence, Carroll Gray,	*Carbondale,*	Architecture.
Leach, William Blake,	*McLean,*	Eng. and Modern Lang.
Leutwiler, Oscar Adolph,	*Highland,*	Mechanical Eng'g.
Loftus, Ella,	*Champaign,*	General, L. and A.
McElfresh, Fred Morgan,	*Jacksonville,*	Natural Science.
Meharry, Jesse Erle,	*Tolono,*	Political Science.
Mercil, Benoni Edward,	*Chicago,*	Electrical Eng'g.
Merrill, Stillwell Frederick,	*Collinsville,*	Chemistry.
Montross, Sarah Elizabeth,	*Chicago,*	Library.
Newell, Mason Harder,	*Springfield,*	General, L. and A.
Nilsson, Olaf Anton,	*Urbana,*	Architectural Eng'g.
Owbridge, Lionel Herbert,	*Springfield,*	Architecture.
Owens, Dasie Margaret,	*Urbana,*	Natural Science.
Paine, Arthur Elijah,	*Rosemond,*	Classical.
Parham, Nellie E,	*Lima, Ind.,*	Library.
Paul, Wesley Arthur,	*Peoria,*	Natural Science.
Pierce, Mary Turner,	*Chicago,*	Library.
Postel, Fred Jacob,	*Mascoutah,*	Electrical Eng'g.
Railsback, Roy J,	*Hopedale,*	Classical.
Raymond, Ruth Cleveland,	*Sidney,*	General, L. and A.
Reat, Fred Lee,	*Tuscola,*	General, L. and A.
Rhoads, Horace Adams,	*Champaign,*	General, L. and A.
Ritchey, Felix,	*Cadwell,*	General, L. and A.
Robinson, Phillip Sidney,	*Sharon, Vt.,*	Art and Design.
Rolfe, Martha Deette,	*Champaign,*	Natural Science.
Rudnick, Paul Frederick Augustus,	*Chicago,*	Chemistry.
Sawyer, John Henry,	*Magnet,*	Natural Science.
Schutt, Walter Robert,	*Belleville,*	Ger. and Romance Lang.
Seely, Garrett Teller,	*Oswego,*	Civil Engineering.
Sheean, Frank Thomas,	*Galena,*	General, L. and A.
Sheean, Henry David,	*Galena,*	General, L. and A.
Sheldon, Carl Edmunds,	*Sterling,*	General, L. and A.
Smith, Charles Augustus,	*Mattoon,*	Architecture.
Smith, Florence Mary,	*Urbana,*	General, L. and A.
Smoot, Elma,	*Danville,*	General, L. and A.
Staley, Maggie Edith,	*Urbana,*	General, L. and A.
Streight, Laura Allana,	*Franklinville, N. Y.,*	Library.
Swenson, Sidney Orin,	*Chicago,*	Electrical Eng'g.
Tarrant, William Henry,	*Champaign,*	Civil Engineering.
Tebbetts, George Edward,	*Chicago,*	Civil Engineering.

Theiss, Otto John,	*Sublette,*	Civil Engineering.
Ullensvang, Martin L,	*Steward,*	Natural Science.
Uthoff, Herman Conrad,	*Peru,*	Philosophy, S.
Vial, Alice Mildred,	*Western Springs,*	General, L. and A.
Volk, Edmund,	*Mendota,*	Electrical Eng'g.
Walker, Herbert William,	*Dundee,*	Electrical Eng'g.
Weaver, Ben: Perley,	*Urbana,*	Natural Science.
Webster, William W,	*Urbana,*	Mechanical Eng'g.
Wernham, James Ingersoll,	*Marengo,*	Natural Science.
Whitmeyer, Mark Hubert,	*Danville,*	Architecture.
Willcox, Maurice Meacham,	*Elmore,*	Civil Engineering.
Williams, George Bassett,	*Washington, D. C.,*	Arch. Eng'g.
Williams, Mary Floyd,	*Oakland, Cal.,*	Library.
Wilmarth, George Henry,	*Aurora,*	Electrical Eng'g.
Wilson, Guy Mitchell,	*Frankfort, Ind.,*	Philosophy, S.
Woodworth, Minnie Barney,	*Champaign,*	General, L. and A.
Young, Bertram Otho,	*LeRoy,*	General, L. and A.

SOPHOMORE

Allen, Frank Gilbert,	*Rock Island,*	Electrical Eng'g.
Appelquist, Jerome Gustav,	*Orion,*	Civil Engineering.
Applegate, Alpheus Miller,	*Atlanta,*	Music.
Arps, George Frederick,	*Cary,*	Natural Science.
Bear, Katharine W,	*Ludlow,*	Math. and Physics.
Bird, Frederick Joel,	*Woodstock,*	Mechanical Eng'g.
Bixby, Alice Persis,	*Champaign,*	Natural Science.
Bocock, Clarence Edgar,	*Bradford,*	General, L. and A.
Booker, Lucile Alice,	*Champaign,*	Eng. and Modern Lang.
Borton, William Franklin,	*DeLand,*	Mechanical Eng'g.
Bracken, Ellis Freeman,	*Greenview,*	Electrical Eng'g.
Branch, Elizabeth,	*Champaign,*	Library.
Branch, James McKenne,	*Champaign,*	Agriculture.
Brown, William Jay,	*Urbana,*	Architecture.
Bryant, Ralph Clement,	*Princeton,*	Natural Science.
Burke, Eugene,	*Champaign,*	Philosophy, S.
Busey, Laura,	*Urbana,*	General, L. and A.
Bush, John Kenyon,	*Joliet,*	General, L. and A.
Campbell, Bruce Alexander,	*Albion,*	General, L. and A.
Church, Walter Samuel,	*Chicago,*	Architecture.
Clinton, Edgar Marcellus,	*Polo,*	Natural Science.
Craig, Frank Hale,	*Fair Grange,*	Political Science.

Curtis, Flora Elizabeth,	*Champaign,*	General, L. and A.
Darmer, George Alexander,	*Champaign,*	Natural Science.
Davison, Herbert,	*Rock Falls,*	Classical.
Dobbins, Lester Charles,	*Champaign,*	Political Science.
Dowiatt, Stanislav,	*Chicago,*	Civil Engineering.
Dunning, William Niel,	*Chicago,*	Civil Engineering.
Eagelston, Frank Ward,	*Bradford,*	Civil Engineering.
Eddy, Clarence LeRoy,	*Leslie, Ia.,*	Civil Engineering.
Fairclo, George Cassius,	*Sycamore,*	Electrical Eng'g.
Few, Walter Henderson,	*Delavan,*	Electrical Eng'g.
Forden, James Russell,	*Springfield,*	General, L. and A.
Foster, William Grant,	*Urbana,*	Architecture.
Francis, Frank D,	*New Lenox,*	General, L. and A.
Freeman, Harry Eben,	*Millington,*	Natural Science.
Fucik, Edward James,	*Chicago,*	Electrical Eng'g.
Gastman, Louise Antoinette,	*Decatur,*	General, L. and A.
Gernand, William Isaac,	*Rossville,*	Electrical Eng'g.
Gibbs, Laura Russell,	*Riverton, Ky.,*	Library.
Gillett, Walter Noble,	*Chicago,*	Electrical Eng'g.
Goldsmith, Elliott Robert,	*Oak Park,*	General, L. and A.
Goodell, John,	*Chandlerville,*	Civil Engineering.
Gray, Robert,	*Lily Lake,*	Electrical Eng'g.
Griffith, George John,	*Savanna,*	Eng. and Modern Lang.
Griffiths, John, Jr.,	*Chicago,*	Architectural Eng'g.
Hanson, Rachelle Margaret,	*Urbana,*	Natural Science.
Harker, George Mifflin,	*Carbondale,*	General, L. and A.
Harker, Oliver Albert, Jr.,	*Carbondale,*	Eng. and Modern Lang.
Harrison, Dale Stuart,	*Sterling,*	Civil Engineering.
Hartrick, Dinchen Clara,	*Urbana,*	Eng. and Modern Lang.
Hartrick, Louis Eugene,	*Urbana,*	Natural Science.
Hartrick, Nancy Emma,	*Urbana,*	Eng. and Modern Lang.
Hasson, Harry,	*Lewistown,*	Chemistry.
Hazzard, Nellie,	*Monticello,*	General, L. and A.
Helton, Alfred Joseph,	*Atwood,*	General, L. and A.
Hines, Edward George,	*Huey,*	Architecture.
Hinrichsen, Edward Eugene,	*Jacksonville,*	Electrical Eng'g.
Hopkins, Milton Irwin,	*Indianapolis, Ind.,*	Electrical Eng'g.
Housel, Oscar Lloyd,	*Galesburg,*	Electrical Eng'g.
Huffman, Carl,	*Caruthersville, Mo.,*	Gen'l, L. and A.
Hughes, Emma Edna,	*Ferris,*	Natural Science.
Husk, Fredrick William,	*Shabbona,*	Electrical Eng'g.

Iddings, Daisy Deane,	*Atlanta,*	General, L. and A.
Jackson, Walter Harker,	*Vienna,*	Civil Engineering.
Johnson, Charles Sunderland,	*Champaign,*	Mechanical Eng'g.
Johnson, Frederick Dawson,	*Alton,*	Mechanical Eng'g.
Johnson, James Edward,	*Champaign,*	General, L. and A.
Johnston, Arthur Russell,	*Joliet,*	Chemistry.
Jordan, George Thomas,	*Tolono,*	General, L. and A.
Joy, Samuel Scott,	*Princeton,*	Architectural Eng'g.
Keeney, Henry Ezra,	*Sterling,*	Mechanical Eng'g.
Kepler, George Frank,	*Ashtabula, Ohio,*	Architecture.
Kettenring, Henry Sylvester,	*Pekin,*	General, L. and A.
Kratz, James Piatt,	*Monticello,*	General, L. and A.
Kuehn, Alfred,	*Chicago,*	Civil Engineering.
Latzer, Jennie Mary,	*Highland,*	Natural Science.
Lee, Julian Liechaski,	*Memphis, Tenn.,*	Mechanical Eng'g.
Logue, Charles Louis,	*Danville,*	Chemistry.
McCollum, Harvey Darling,	*Louisville,*	General, L. and A.
McCune, Fred Leavitt,	*Sterling,*	Mechanical Eng'g.
McMurry, Fred Russell,	*Normal,*	General, L. and A.
McWilliams, Nellie Louise,	*Champaign,*	General, L. and A.
Martin, Robert William,	*Wilmington,*	Political Science.
Mather, Grace Ella,	*Joliet,*	Natural Science.
Mather, Lydia Maria,	*Joliet,*	Latin.
Maury, Harvey,	*Rossville,*	Civil Engineering.
Mayall, Edwin Lyman,	*Peoria,*	Mechanical Eng'g.
Mills, Ralph Walter,	*Webster Groves, Mo.,*	Nat. Science.
Moorshead, Alfred Lee,	*St. Louis, Mo.,*	Architecture.
Norton, Wilbur Perry,	*Alton,*	Electrical Eng'g.
Olsen, Joseph Matthias,	*Seneca,*	General, L. and A.
Owens, Wilkens Hoover,	*Baltimore, Md.,*	Natural Science.
Palmer, William Gay,	*Princeton,*	General, L. and A.
Pettinger, Robert Gerald,	*Cumberland, Ia.,*	Electrical Eng'g.
Prickett, Fred William,	*Lewistown,*	Agriculture.
Radley, Guy Richardson,	*Sandwich,*	Electrical Eng'g.
Rapp, George Leslie,	*Carbondale,*	Architecture.
Raymond, John Eaton,	*Sidney,*	Agriculture.
Reimers, Fred William,	*Evanston,*	Electrical Eng'g.
Ricker, Raymond Craver,	*Harvey,*	Architecture.
Robbins, Ernest Thompson,	*Payson,*	Agriculture.
Robertson, Lloyd Silas,	*Barrington,*	Agriculture.
Rochow, Carl John Frederick,	*Rock Island,*	Natural Science.

Safford, Edward Brigham,	*Sycamore,*	Chemistry.
Samson, Charles Leonard,	*Deers,*	Mechanical Eng'g.
Sandberg, Carl Eric,	*Köping, Sweden,*	Architecture.
Schenck, Charles, Jr.,	*Chicago,*	Civil Engineering.
Schneider, Edward John,	*Pontiac,*	Electrical Eng'g.
Sherman, William Horace,	*Sullivan,*	General, L. and A.
Slocum, Roy Harley,	*Loda,*	Civil Engineering.
Smith, George Russell,	*Urbana,*	Mechanical Eng'g.
Smith, William Walter,	*Broadlands,*	General, L. and A.
Smurr, Tom Woods,	*Ottawa,*	Political Science.
Snider, Earl Quinter,	*Cerro Gordo,*	Electrical Eng'g.
Soverhill, Harvey Allen,	*Tiskilwa,*	Mechanical Eng'g.
Spurgin, Isaac Meigs,	*Urbana,*	General, L. and A.
Stakemiller, Benjamin Benton,	*Sterling,*	Civil Engineering.
Stern, Renée Bernd,	*Chicago,*	Library.
Still, Samuel Jay,	*Cerro Gordo,*	Civil Engineering.
Stubbins, Lewis Clark,	*Mattoon,*	Civil Engineering.
Thompson, George Henry,	*Champaign,*	Political Science.
Thompson, Ralph,	*Carbondale,*	General, L. and A.
Thorpe, John Charles,	*Urbana,*	Mechanical Eng'g.
Tompkins, Clara Alice,	*Grover,*	Agriculture.
Tracy, Alice Emelyn,	*Biloxi, Miss.,*	Architecture.
Tyler, Walter Simeon,	*Joliet,*	Electrical Eng'g.
Vance, William Herbert,	*Edwardsville,*	Civil Engineering.
VanPatten, Seth Fields,	*Clarion, Ia.,*	General, L. and A.
Wason, Chester Herman,	*Canton,*	Electrical Eng'g.
Wehrstedt, Otto Charles,	*Evanston,*	Civil Engineering.
Wetherbee, Charles Earl,	*Sterling,*	Architecture.
Widmann, Otto,	*Old Orchard, Mo.,*	Natural Science.
Wiley, Raymond Sly,	*Potomac,*	Architecture.
Wood, Harvey Edgerton,	*Joliet,*	Chemistry.
Woods, William Francis,	*Ludlow,*	Classical.
Wray, Thomas,	*Chicago,*	Electrical Eng'g.
Zmrhal, Yaroslav,	*Chicago,*	Natural Science.

FRESHMEN

Adams, Elisha Brown,	*Jacksonville,*	Electrical Eng'g.
Aikin, Arthur Lewis,	*Urbana,*	Chemistry.
Allen, John L,	*Roodhouse,*	Electrical Eng'g.
Armitage, James Howard,	*Buckingham,*	Classical.
Armstrong, Emilie Edith,	*Champaign,*	General, L. and A.

*Arthur, Charles Alvin,	*Champaign,*	Electrical Eng'g.
Atwood, John Roy,	*Roscoe,*	Agriculture.
Bailey, Donald Herbert,	*Clinton,*	Classical.
Baker, Horatio Weber,	*Champaign,*	Mechanical Eng'g.
Baldwin, Aneta,	*Paris,*	General, L. and A.
Ballard, David Paige,	*Maywood,*	Electrical Eng'g.
Barrett, James Theophilus,	*Butler,*	General, L. and A.
Barry, George Richard,	*Hillsboro,*	Electrical Eng'g.
Bassett, Frank Deloss,	*Kewanee,*	Architectural Eng'g.
Bates, John Schuyler,	*Monmouth,*	Civil Engineering.
Beebe, Florence Jennie,	*Blunt, So. Dak.,*	General, L. and A.
Bell, Edgar Deforest,	*Urbana,*	Mechanical Eng'g.
Bernhardi, Carl Oscar,	*Rock Island,*	Natural Science.
Berry, Claude,	*Paw Paw,*	Civil Engineering.
Black, Alice Mary,	*Urbana,*	Eng. and Modern Lang.
Black, George McCall,	*Canton,*	Electrical Eng'g.
Boon, Harry Larry,	*Armstrong,*	General, L. and A.
Bowles, Ida Huston,	*Paris,*	General, L. and A.
Brayton, Louis Frederick,	*Mt. Morris,*	Architectural Eng'g.
Brookie, Frank McCord,	*Vincennes, Ind.,*	Civil Engineering.
Brunner, Sidonia,	*Peru,*	Art and Design.
Buchanan, Edwin Boyd,	*Paris,*	Natural Science.
Burdick, Jay Horace,	*Elgin,*	Agriculture.
Burleigh, Cornelius Howard,	*Evanston,*	Architectural Eng'g.
Burroughs, Zoelah Maria,	*Lafayette, Ind.,*	General, L. and A.
Caldwell, Charles Burr,	*Monticello,*	Natural Science.
Calhoun, Etta Anne,	*Champaign,*	Natural Science.
Campbell, Ashton Ellsworth,	*Champaign,*	Political Science.
Canmann, Harris Louis,	*Chicago,*	Civil Engineering.
Chamberlin, Charles Cory,	*Hoopeston,*	Electrical Eng'g.
Chapin, Edward Pierce,	*Champaign,*	Eng. and Mod. Lang.
Chapman, Charles Hiram,	*Vienna,*	Classical.
Charles, Clayton Henry,	*Woodstock,*	Natural Science.
Chester, Marguerite,	*Champaign,*	General, L. and A.
Chipps, Willis Cullen,	*Sullivan,*	Mechanical Eng'g.
Chisholm, Estella,	*Farmer City,*	Classical.
Coen, Homer,	*Olney,*	General, L. and A.
Collins, Guy Richard,	*Urbana,*	Mechanical Eng'g.
Collins, John Milton,	*Keokuk, Ia.,*	Architectural Eng'g.

*Deceased.

Collis, Frank Bernard,	*Rockford,*	Electrical Eng'g.
Cook, Clara,	*Farmer City,*	Classical.
Crossland, George Marshall,	*Sheldon,*	General, L. and A.
Crum, Bird Emily,	*Farmer City,*	Classical.
Cummings, Wilber Judd,	*Sparta, Mich.,*	Architecture.
Curfman, Lawrence Everett,	*Urbana,*	Math. and Physics.
Daggett, Daisy Viola,	*Macon,*	Natural Science.
Daugherty, Anna Elizabeth,	*Champaign,*	General, L. and A.
Davis, Mary Belle,	*Urbana,*	Math. and Astron.
Davis, Roscoe Conklin,	*Ashland, Ky.,*	Electrical Eng'g.
Day, Charles Phillip,	*Champaign,*	Mechanical Eng'g.
Denning, Harry,	*Gillum,*	Agriculture.
Dinwiddie, Elizabeth,	*Champaign,*	Architecture.
Drew, Fred Leon,	*Elgin,*	Civil Engineering.
Dunn, Cornelia Beatrice,	*Paris,*	General, L. and A.
Ealey, Minnie,	*Urbana,*	Music.
Edwards, Ralph Owen,	*Belleflower,*	General, L. and A.
Eidam, Edward George,	*Blue Island,*	Mechanical Eng'g.
Emmett, Arthur Donaldson,	*Peoria,*	Architectural Eng'g.
Evans, Waldo Carl,	*Danville,*	Eng. and Mod. Lang.
Ferris, Harold Gano,	*Carthage,*	Mechanical Eng'g.
Fishback, Mason McCloud,	*Paris,*	General L. and A.
Fisher, James Melville,	*Neoga,*	Classical.
Frazey, Nellie May,	*Urbana,*	General, L. and A.
Frost, Frank G,	*Gays,*	Electrical Eng'g.
Fulton, Robert Bruce,	*Hartford City, Ind.,*	Civil Eng'g.
Gardiner, Charles Matthew,	*Champaign,*	Chemistry.
Garver, Louis Cormany,	*Rockford,*	Civil Engineering.
Garvin, Joseph Aloysius,	*Memphis, Tenn.,*	Architecture.
Gayman, Myrtle,	*Champaign,*	Library.
Gelder, Edgar Earl,	*Virden,*	Natural Science.
Gibbs, George, Jr.,	*Riverton, Ky.,*	Natural Science.
Gilmore, Thomas,	*Macomb,*	Electrical Eng'g.
Gleason, Henry Allan,	*Champaign,*	Natural Science.
Goodwin, John Mitchell,	*Hot Springs, Ark.,*	General, L. and A.
Gordon, Joseph Hinckley,	*Vandalia,*	General, L. and A.
Graber, Howard Tyler,	*Peoria,*	Chemistry.
Green, Frances Myrtle,	*Urbana,*	General, L. and A.
Gridley, Harry Norman,	*Virginia,*	General, L. and A.
Griswold, Augustus Harold,	*Princeton,*	Electrical Eng'g.
Gross, Albertina Marguerite,	*Joliet,*	Natural Science.

Gulick, Margaret Grace,	*Champaign,*	General, L. and A.
Haake, Charles John,	*Chicago,*	General, L. and A.
Haas, Grace Anne,	*Farmer City,*	General, L. and A.
Hammers, Edna Rose,	*Champaign,*	General, L. and A.
Hannan, John Edward,	*Champaign,*	General, L. and A.
Hartrick, Guy Russell,	*Urbana,*	Natural Science.
Harvey, Raymond Wade,	*Griggsville,*	Natural Science.
Hayes, Zella Bernice,	*Rankin,*	General, L. and A.
Hays, Carl,	*Urbana,*	Mechanical Eng'g.
Headen, Thomas Moulton,	*Shelbyville,*	General, L. and A.
Hensley, Lee Grant,	*Champaign,*	Natural Science.
Hensley, Marion Charles,	*Champaign,*	Chemistry.
Hicks, Byron Wallace,	*Warren,*	Electrical Eng'g.
Hinckley, George Clifford,	*Aurora,*	Chemistry.
Hinkle, Ida May,	*Champaign,*	General, L. and A.
Hobble, Arthur Casson,	*Rushville,*	Electrical Eng'g.
Holcomb, Timothy Osmond, Jr.,	*Milmine,*	Math. and Physics.
Hopkins, Mabel,	*Indianapolis, Ind.,*	General, L. and A.
Hoppin, Charles Albert,	*Aurora,*	Mechanical Eng'g.
Horner, Harlan Hoyt,	*Cerro Gordo,*	General, L. and A.
Hunter, Edward Spencer,	*Paris,*	Civil Engineering.
Hunter, Harry Edgar,	*Newton, Ia.,*	Architecture.
Kariher, Harry,	*Champaign,*	Natural Science.
Katt, Adolph John,	*Belleville,*	Mechanical Eng'g.
Keator, Edward Oris,	*Polo,*	Electrical Eng'g.
Kemmerer, John Martin,	*Assumption,*	Civil Engineering.
Ketchum, George Spencer,	*Champaign,*	Natural Science.
Kirkpatrick, Harlow Barton,	*Anna,*	Civil Engineering.
Kreikenbaum, Charles Otto Adolph,	*Chicago,*	Chemistry.
Lamkin, Grace Minerva,	*Champaign,*	General, L. and A.
Layton, Katherine Alberta,	*Canton,*	Classical.
Lee, Albert R,	*Champaign,*	General, L. and A.
Lewis, Addison Thompson,	*Chatham,*	Chemistry.
Lindley, Walter Charles,	*Neoga,*	General, L. and A.
Linzee, Fred Norton,	*Du Quoin,*	Electrical Eng'g.
Lodge, Paul Edmund,	*Monticello,*	General, L. and A.
Logan, Harry Ralph,	*Arcola,*	General, L. and A.
Lotz, John Rudolph,	*Lockport,*	Electrical Eng'g.
Lowenthal, Fred,	*Chicago,*	Classical.
Lyman, Frank Lewis,	*Farmingdale,*	Chemistry.
Lytle, Ernest Barnes,	*Decatur,*	Math. and Physics.

McAnally, Harry Forrest,	*Paris,*	Electrical Eng'g.
McCall, Eugene Adolphus,	*Vienna,*	General, L. and A.
McCormick, Roscoe,	*Garber,*	Natural Science.
McDowell, William Orin,	*Waterloo, Ia.,*	Natural Science.
McFadden, John Hill,	*Arcola,*	General, L. and A.
McGee, Benjamin Franklin,	*Vienna,*	General, L. and A.
McGill, Ruel Starr,	*Chicago,*	Civil Engineering.
McLane, Elmer Cavett,	*Allerton, Ia.,*	Classical.
McLean, Elmer Lyman,	*Lombardville,*	Mechanical Eng'g.
Maffit, Robert Usrey,	*Decatur,*	Civil Engineering.
*Magner, Harold Bernard,	*Morris,*	Civil Engineering.
Mahurin, Guy Marshal,	*Indianapolis, Ind.,*	Architecture.
Manspeaker, Pearle,	*Champaign,*	General, L. and A.
Martin, Camden Edward,	*Lacon,*	General, L. and A.
Martin, Webb Wilde,	*Jerseyville,*	Chemistry.
Mathews, Clyde Milton,	*Urbana,*	General, L. and A.
Merrill, Orland Paul,	*Elgin,*	Natural Science.
Miles, Rutherford Thomas,	*Urbana,*	General, L. and A.
Miller, George Louis,	*Champaign,*	Natural Science.
Miller, William Pitt,	*Champaign,*	Math. and Physics.
Miner, Timothy Ralph,	*Adair,*	Agriculture.
Mitchell, Annie,	*Bement,*	General, L. and A.
Moon, Arthur Edward,	*Champaign,*	General, L. and A.
Murphy, John Campbell,	*Long Grove, Ia.,*	Chemistry.
Murphy, Merritt Norton,	*Chicago,*	Electrical Eng'g.
Murray, Charles Brent,	*LeRoy,*	Electrical Eng'g.
Myers, Jesse J,	*Green River,*	Natural Science.
Newcomb, Cyrus Forsyth,	*Champaign,*	Natural Science.
Nichols, Gunther,	*Lima, Ind.,*	General, L. and A.
Norton, Charles Waterman,	*Lockport,*	Classical.
Null, Marion Michael,	*Blandinsville,*	Natural Science.
O'Hair, Edna,	*Laurel, Ind.,*	General, L. and A.
Otwell, Allen Meade,	*Plainview,*	Natural Science.
Parkins, Charles Raymond,	*Chicago,*	Civil Engineering.
Patrick, Frederick Phillips,	*Blue Island,*	Architectural Eng'g.
Peeples, Cornelius James,	*Shawneetown,*	General, L. and A.
Plant, Sarah Lulu,	*Champaign,*	General, L. and A.
Pletcher, Nuba Mitchel,	*Hoopeston,*	Natural Science.
Polk, Robert Collins,	*Champaign,*	General, L. and A.
Pollard, Earle Royal,	*Centralia,*	Mechanical Eng'g.

*Deceased.

Price, Helen Louise,	*Champaign,*	Library.
Radcliffe, William Hickman,	*Springfield,*	Civil Engineering.
Radebaugh, Estella May,	*Rippon, Ia.,*	General, L. and A.
Read, Nellie Lewis,	*Urbana,*	General, L. and A.
Reardon, Neal Daniel,	*Boynton,*	General, L. and A.
Reeves, George I,	*Wauponsee,*	Natural Science.
Roberts, Harry Ashton,	*Ottawa,*	Civil Engineering.
Rolfe, Mary Annette,	*Champaign,*	Natural Science.
Russell, William Cissna,	*Milford,*	Civil Engineering.
Sawyer, George Kingsley,	*Carpentersville,*	Mechanical Eng'g.
Schulte, Mabel,	*Hopedale,*	General, L. and A.
Schulz, Ernest A,	*White, So. Dak.,*	Electrical Eng'g.
Scott, Frank William,	*Centralia,*	General, L. and A.
Seidel, Charles William,	*Sterling,*	Civil Engineering.
Shawhan, William Warren,	*Champaign,*	Natural Science.
Short, Walter Campbell,	*Fillmore,*	General, L. and A.
Shuler, Hugh McWhurr,	*Gilchrist,*	Civil Engineering.
Simmons, Aaron Trabue,	*Jerseyville,*	Architecture.
Sims, Mrs. Flora Morris,	*Urbana,*	Art and Design.
Sluss, Alfred Higgins,	*Tuscola,*	Electrical Eng'g.
Smith, Clarence Kirby,	*Monticello,*	Electrical Eng'g.
Smith, George Carroll,	*Flora,*	General, L. and A.
Steely, George,	*Danville,*	General, L. and A.
Stevenson, Arthur Gladred,	*Urbana,*	General, L. and A.
Stevenson, Ralph Ewing,	*Bloomington,*	Mechanical Eng'g.
Stewart, Miles Vincent,	*Toulon,*	Electrical Eng'g.
Storrs, Martha,	*Creston, Ia.,*	General, L. and A.
Summerhays, William Arthur,	*Chicago,*	Civil Engineering.
Swift, Charles Clyde,	*Streator,*	Civil Engineering.
Tallyn, Louis Liston,	*Benson,*	Civil Engineering.
Thornton, Robert Ingersoll,	*Magnolia,*	Civil Engineering.
Tull, Effie May,	*Farmer City,*	Classical.
Van Arsdale, Edith Maud,	*Beatrice, Neb.,*	Library.
Van Duzer, Edward Craig,	*Rockford,*	General, L. and A.
Veirs, David Carroll,	*Urbana,*	Mechanical Eng'g.
Wahl, Henry,	*Sterling,*	Electrical Eng'g.
Wait, Ernest Ludden,	*Urbana,*	Natural Science.
Warner, Harry Jackson,	*Prophetstown,*	Chemistry.
Webb, Alma Blanche,	*Taylorville,*	Classical.
Webb, Edwin Warnock,	*Bloomington,*	Civil Engineering.
Widmayer, George Henry,	*Virginia,*	General, L. and A.

Wilcox, Emmons John,	*Seneca,*	General, L. and A.
Williams, Seymour,	*Monticello,*	Classical.
Willis, Harry Thomas,	*Champaign,*	Mechanical Eng'g.
Willis, Wilber Fred,	*Chicago,*	Civil Engineering.
Willson, Hiram Everett,	*Carbondale,*	Electrical Eng'g.
Wolcott, Richard John,	*Batavia,*	Mechanical Eng'g.
Woodruff, Ralph Hiram,	*Eagle Point,*	General, L. and A.
Wright, Sidney Walter,	*Atlanta,*	General, L. and A.
Zipf, Ferdinand,	*Hopedale,*	Natural Science.
Zuck, Cassius Harmond,	*Rockford,*	Mechanical Eng'g.

SPECIALS

Adsit, Bertram Wilson,	*Wellington,*	General, L. and A.
Ahlrich, Augusta,	*Urbana,*	Music.
Ainsworth, Nellie Elizabeth,	*Champaign,*	Music.
Allen, Albert Miller,	*Oberlin, Ohio,*	Architecture.
Allen, Layton,	*Indianapolis, Ind.,*	Architecture.
Armold, Clarence Scarborough	*Payson,*	Electrical Eng'g.
Atwood, Frank Howard,	*Dwight,*	General, L. and A.
Bartholomew, Ross,	*Vermont,*	Agriculture.
Bear, Ida Pauline,	*Ludlow,*	Art and Design.
Black, Mrs. Anna Eliza,	*Champaign,*	Philosophy, S.
Boggess, Leaton McCollister,	*Roodhouse,*	General, L. and A.
Bradfield, Angie May,	*Palermo,*	General, L. and A.
Breed, Elmer,	*Monmouth,*	Natural Science.
Brode, Arletta Elizabeth,	*Urbana,*	Natural Science.
Brookie, Mrs. Alice Austin,	*Vincennes, Ind.,*	Art and Design.
Brower, Florence,	*Champaign,*	Music.
Brown, Mrs. Lucy Stewart,	*Urbana,*	Mathematics.
Brown, William Bolt,	*Champaign,*	General, L. and A.
Buchanan, James William,	*Charleston, Ind.,*	Pedagogy, S.
Burnham, Mrs. Madge Julia,	*Urbana,*	General, L. and A.
Busey, Allen,	*Urbana,*	Music.
Calvin, Bertrand,	*Champaign,*	History.
Campbell, Mae Athleen,	*Champaign,*	Music.
Campbell, Mary Ellen,	*Rankin,*	Art and Design.
Carlisle, Mrs. Clara Thompson,	*Elgin,*	Library.
Carter, Carrie Mabel,	*Champaign,*	Art and Design.
Clark, William Owen,	*Scottland,*	Mechanical Eng'g.
Colvin, Mrs. Sarah Jane,	*Urbana,*	Art and Design.
Conard, Philip Arthur,	*Monticello,*	General, L. and A.

Crathorne, Annie Ellen,	*Champaign,*	Music.
Craw, Nellie Edna,	*Sadorus,*	Music.
Crawford, Emma,	*Urbana,*	Music.
Crossley, Elijah R,	*Marshall,*	Natural Science.
Cunningham, Mrs. Harriet M,	*Sidney,*	Music.
Custer, Mae Viola,	*Danville,*	Music.
Draper, Charlotte Leland,	*Urbana,*	Music.
Drummond, William Eugene,	*Austin,*	Architecture.
Dunlap, Ralph VanBuren,	*Canton, S. Dak.,*	General, L. and A.
Easton, Louis Byron,	*Hudson,*	Natural Science.
Ebersol, Elmer Tryon,	*Ottawa,*	Natural Science.
Emery, Fannie Louise,	*Adams, N. Y.,*	Art and Design.
Eno, Imle L,	*Pomona, Cal.,*	Electrical Eng'g.
Fairchild, Oscar Harmon,	*Danville,*	Natural Science.
Fenner, Edith L,	*Urbana,*	Music.
Ford, Ralph Leo,	*Lewistown,*	Electrical Eng'g.
Franks, Charles Wilber,	*Brookville,*	General, L. and A.
Frazier, Elmer Allen,	*Champaign,*	General, L. and A.
Freeman, James Alexander,	*Carbondale,*	Natural Science.
Frison, Edward Howard,	*Champaign,*	Art and Design.
Goodspeed, Stella,	*Urbana,*	Music.
Green, Otis Martin,	*Urbana,*	Natural Science.
Grinnell, Jessie Clare,	*Mayfair,*	Art and Design.
Hall, Arthur Raymond,	*East Lynn,*	General, L. and A.
Hanson, Francis Owen,	*Fifer,*	General, L. and A.
Harris, Thomas Luther,	*Modesto,*	Political Science.
Hauter, Andrew Edgar,	*Tiskilwa,*	General, L. and A.
Hedges, Charles Wilbur,	*Urbana,*	Natural Science.
Hipple, James Stone,	*Elgin,*	Mechanical Eng'g.
Hubachek, Lambert W,	*Racine, Wis.,*	Architecture.
Hughes, Davis Everett,	*Pinkstaff,*	General, L. and A.
Hulsebus, Bernard Lubertus,	*Saxon, Ia.,*	Architecture.
Hutchinson, Frank,	*Olney,*	Civil Engineering.
Irwin, Herbert Ellwood,	*Galesburg,*	Mechanical Eng'g.
Jack, Robert Douglas,	*Chicago,*	Natural Science.
Jacobs, Henry,	*Virginia,*	General, L. and A.
Ketchum, Mary Phronia,	*Champaign,*	Art and Design.
Kitterman, Fred Raymond,	*Tiskilwa,*	General, L. and A.
Kuhn, Rudolph,	*Champaign,*	Art and Design.
Latzer, Alice Bertha,	*Highland,*	Natural Science.
LeFevre, Ervilla Belle,	*Urbana,*	Music.

Leib, Harvey Ellsworth,	*Exeter,*	General, L. and A.
Lesch, Mrs. Sylvia Adda,	*Ivesdale,*	Music.
Lewis, Stanley Melville,	*Urbana,*	Art and Design.
Liggett, Estelle Helen,	*Danville,*	Music.
Loeffler, Katharine Armina,	*Ogden,*	Music.
Love, Justin Jay,	*Moweaqua,*	Natural Science.
McIntyre, Margaret Pearl,	*Newman,*	Music.
McLaughlin, Nora Elvira,	*Penfield,*	Music.
Millar, Nellie Decker,	*Mattoon,*	Art and Design.
Mojonnier, Timothy,	*Highland,*	Natural Science.
Moon, Amy Constance,	*Champaign,*	General, L. and A.
Moore, Lucy Kate,	*Pesotum,*	Music.
Mount, Madison Hoge,	*Walnut Prairie,*	Electrical Eng'g.
Myers, Elsie Mae,	*Eldorado, Kan.,*	Music.
Nabstedt, Frederick,	*Davenport, Ia.,*	Electrical Eng'g.
Nash, Benjamin Franklin,	*Champaign,*	Music.
Needham, John Lowry,	*Neoga,*	Pedagogy, S.
Odbert, Alice Bradway,	*Indianola,*	Music.
Padget, Will,	*Palmyra,*	Political Science.
Patterson, Edith Lynn,	*Danville,*	General, L. and A.
Porteous, Mary Simpson,	*Dixon,*	General, L. and A.
Praeger, William Emilius,	*Urbana,*	Natural Science.
Purcell, Etta Belle,	*St. Joseph,*	General, L. and A.
Putnam, Alice,	*Champaign,*	General, L. and A.
Quirk, Elizabeth,	*Champaign.*	Music.
Reynolds, Elodie May,	*Golden,*	Art and Design.
Rhoads, Emma May,	*Champaign,*	General, L. and A.
Robinson, Robert Bruce,	*Albany,*	Civil Engineering.
Schermerhorn, Laura Dell,	*Newtown, Ind.,*	Music.
Scott, John T,	*LaMoille,*	General, L. and A.
Seaborg, Amanda Eleanora,	*Weldon,*	Music.
Seymour, Roy Vincent,	*Dwight,*	General, L. and A.
Shaw, Richard Sharrocks,	*Chicago,*	General, L. and A.
Shelton, Addison M,	*Loami,*	General, L. and A.
*Sim, Anna Mae,	*Urbana,*	Art and Design.
Simpson, Robert Archibald,	*Vincennes, Ind.,*	Agriculture.
Smith, Helen Amelia,	*Sidney,*	Music.
Smith, Percy Almerin,	*Dixon,*	General, L. and A.
Sperry, James Franklin,	*Champaign,*	Political Science.
Stanley, Otis Orion,	*Champaign,*	Classical.

*Deceased.

Stanton, Burt Tompkins,	*Chicago,*	Mechanical Eng'g.
Stevens, Frank Asbury,	*Monticello,*	General, L. and A.
Stoltey, Jennie Florence,	*Champaign,*	General, L. and A.
Stotlar, Edwin M,	*Herrin,*	General, L. and A.
Thordenberg, Fred Moses,	*Rock Island,*	Architecture.
Tillotson, Mabel,	*Kinder, La.,*	Music.
Tumbleson, Alvin Tresdell,	*Harrisonville, Mo.,*	Architecture.
Weaver, Edith Maria,	*Urbana,*	Music.
Weinberg, Simon, Jr.,	*Galesburg,*	Electrical Eng'g.
Wells, Geneva Estelle,	*DuQuoin,*	General, L. and A.
Wentworth, John Louis,	*Kewanee,*	Mechanical Eng'g.
Wetherell, Charles E,	*Urbana,*	Architecture.
Williams, Ralph Joseph,	*Galesburg,*	Architecture.
Williamson, George Warren,	*Blandinsville,*	General, L. and A.
Wilson, Mrs. Ina,	*Frankfort, Ind.,*	General, L. and A.

WINTER SCHOOL IN AGRICULTURE—1898

Arnott, James Valentine,	*Paxton.*
Atkinson, Avelyn Charles,	*Champaign.*
Bishop, Malon Lyle,	*LeRoy,*
Bondurant, Frank Leigh,	*Paxton.*
Buffum, George Nelson,	*LaFayette.*
Burrows, James Bering,	*Decatur.*
Cliffton, Marion,	*Urbana.*
Coffmen, Thurlow Weed,	*Stratford.*
Downs, Fred Lawson,	*Downs.*
Dunlap, Fred Hiram,	*Savoy.*
Engelmann, Julius,	*Shiloh.*
Havard, Bert Henry,	*Urbana.*
Jones, Frank Cyrus,	*Chebanse.*
Kastning, Louis Fred,	*Schaumberg.*
Lyford, Custer Charles,	*Pasco.*
Maxcy, Leigh Forest,	*Pasfield.*
Patterson, Charles Irwin,	*Mason City.*
Pfingston, Fred William,	*Meacham.*
Salge, William,	*Schaumberg.*
Seago, Charles T,	*Jerseyville.*
Seltzer, John Franklin,	*Fairland.*
Vorhes, John William,	*Springfield.*
Wyllie, Albert,	*Vincennes, Ia.*

SCHOOL OF LAW

THIRD YEAR

Kent, Louis Maxwell, A.B., *(Univ. of Ill.)*,	*Danville.*
Kuykendall, Andrew Jackson, A.B., *(DePauw Univ.)*,	*Vienna.*
Spalding, Roy Verner,	*Byron.*
Worthen, George Bedell,	*Warsaw.*

FIRST YEAR

Adams, Otto C,	*Cerro Gordo.*
Armstrong, J Latrell,	*Urbana.*
Baker, Zion Frost,	*Sullivan.*
Barnett, Ellis Richard,	*Clinton.*
Barrett, George Francis,	*Chicago.*
Beatty, John Wertz,	*Delavan.*
Bixby, Guy Masson,	*St. Louis, Mo.*
Boyd, Hobart Sherman,	*Lewistown.*
Cofield, Jesse Douglas,	*Arcola.*
Cooper, Fred Worth,	*Champaign.*
Davidson, Roy Nebeker,	*Champaign.*
Dougherty, Horace Raymond, A.B., *(Univ. of Chicago)*,	*Peoria.*
Douglass, Reuben S, A.B., *(Marietta College)*,	*Champaign.*
Dunseth, James Morten,	*Urbana.*
Eggleston, Jacob Lloyd,	*Champaign.*
Glenn, Leslie Leland,	*Champaign.*
Glenn, Otis Ferguson,	*Champaign.*
Grossberg, Harry Altman,	*Chicago.*
Jackson, Andrew Oliver, A.B. *(Lake Forest Univ.)*,	*Lake Forest.*
Ketchum, Margaret Adéle,	*LaPrairie,*
Lamet, Louis Harman,	*Warsaw.*
Manny, Fred Hugh, B.S., *(Univ. of Ill.)*,	*Urbana.*
May, Fred Hutchinson,	*Prophetstown.*
Mulliken, Albert Danforth,	*Champaign.*
Ostrowski, Samuel,	*Chicago.*
Phillips, Thomas Lewis,	*Mt. Carroll.*

Pontious, Ralph,	*Macomb.*
Rhodes, Edward Melvin,	*Bloomington.*
Schaefer, Peter Philip,	*Carlyle.*
Spiesberger, Herbert,	*Chicago.*
Trevett, John Howard,	*Champaign.*
Van Brundt, Chester S,	*Champaign.*
Van Horne, Sada,	*Freeport.*
Webb, Otto Thorle,	*Bement.*
Wesemann, Adolph Henry,	*LaGrange.*

SCHOOL OF MEDICINE
[COLLEGE OF PHYSICIANS AND SURGEONS OF CHICAGO]

SENIOR CLASS

NAME.	STATE.	PRECEPTOR.
Bacon, Victor V., M.D.,	*Illinois.*	Faculty.
Baker, Henry L.,	*Minnesota.*	J. D. Higgins.
Bebb, Walter S.,	*Illinois.*	Henry Richings.
Belitz, William,	*Wisconsin.*	Faculty.
Beveridge, James M., A.B.,	*Illinois.*	Faculty.
Bingley, M. Arista,	*Texas.*	Faculty.
Bjorkman, David A. T., A.B.,	*Sweden.*	Gustaf Bjorkman.
Blayney, Frederick H., A.B.,	*Pennsylvania.*	Faculty.
Brown, Darwin E.,	*Wisconsin.*	Faculty.
Brownell, William Flockton,	*Michigan.*	W. McCallum.
Bursma, Jacob, A.B.,	*Michigan.*	Benj. Pyle.
Butts, J. Baptist,	*Canada.*	Faculty.
Byers, Emery M.,	*Illinois.*	R. H. Burton.
Cahill, Leo L.,	*Michigan.*	Faculty.
Carr, Bert. Mather,	*Michigan.*	Faculty.
Carroll, Henry Colistis,	*New York.*	Faculty.
Conard, Amos F.,	*Illinois.*	Faculty.
Conner, Frank H., B.S.,	*Iowa.*	Faculty.
Coon, George E.,	*Wisconsin.*	A. S. Maxson.
Corbin, John Francis, B.S.,	*Illinois.*	Dr. Aldrich.
Crofton, Alfred C., M.D.,	*Illinois.*	Faculty.
Cummings, Frederick S.,	*Illinois,*	C. E. Cook.
Dillon, Ira Hugh,	*Iowa,*	W. W. Williams.
Dolan, Aloysius N. J., A.M.,	*Illinois,*	C. D. Bradley.
Dowdall, William T.,	*Illinois,*	Willoughby Walling.
Emmerson, Robert,	*Illinois,*	W. T. Eckley.

NAME.	STATE.	PRECEPTOR.
Errant, Mrs. Morey, M.D.,	*Illinois,*	Faculty.
Feeney, Francis Sebastian,	*Illinois,*	Faculty.
Flanagan, Bartholomew F.,	*Indiana,*	J. F. Hibbard.
Flemming, Geoffrey J.,	*Illinois,*	Faculty.
Fletcher, Marcus S.,	*Illinois,*	Faculty.
Ford, Ward Redfield, Ph.G.,	*Illinois,*	Bayard Holmes.
Fuson, Amandus W.,	*California,*	S. H. Manley.
Garber, Samuel Carson, B.S.,	*Virginia,*	D. Newcomer.
Graeser, Henry Bernard,	*Iowa,*	B. N. Graeser.
Grey, Margaret, M.D.,	*Illinois,*	Faculty.
Hadley, I. H., M.D.,	*Illinois,*	Faculty.
Hall, Hugh Martin,	*Indiana,*	C. E. Dutrow.
Hambley, Thomas J., Ph.B.,	*Connecticut,*	Faculty.
Hamill, Mrs. Eunice Bertha,	*Illinois,*	H. P. Newman.
Hart, William E.,	*Illinois,*	Faculty.
Heaton, Elbert E., M.D.,	*Missouri,*	Faculty.
Hill, George B. M.,	*Iowa,*	B. Thompson.
Homer, Herman Corwin,	*Iowa,*	L. E. Eslick.
Hooper, Martin L., M.D.,	*Iowa,*	Faculty.
Hovenden, John Henry,	*Iowa,*	Drs. Jones and Johnson.
Hunt, Ernest A., B.S.,	*Illinois,*	Faculty.
Husk, Charles E.,	*Illinois,*	Faculty.
Hutchinson, Charles S., B.S.,	*Iowa,*	A. Richmond.
Irwin, Wentworth Lee, M.D.,	*Illinois,*	A. H. Brumbach.
Johnson, Simeon R., B.S.,	*Illinois,*	C. W. Johnson.
Kalacinski, Felix,	*Illinois,*	Carl Beck.
Kemp, Oliver P., B.S.,	*Indiana,*	Drs. Brinkerhoof and Scott.
Kilbridge, James A., M.D.,	*Iowa,*	Faculty.
King, Clarence B.,	*Illinois,*	O. A. King.
Kirkland, Benjamin F.,	*Iowa,*	R. T. Jewell.
Kittredge, Charles Albert,	*New York,*	J. H. Lee.
Knight, Eugene C.,	*Missouri,*	Faculty.
Kohler, Arvid Ernest,	*Illinois,*	W. K. Sloan.
Lowenrosen, Armin,	*Hungary,*	M. Lowenrosen.
Lucas, Frank B.,	*Illinois,*	E. J. Lucas.
Lyon, Elijah A., Ph.G., M.D.,	*Illinois,*	Faculty.
McManes, Matthew E.,	*Ohio,*	H. W. Todd.
McManus, Thomas U., A.B.,	*Iowa,*	D. W. Crouse.
Miller, A. Baxter,	*Pennsylvania,*	Faculty.

NAME.	STATE.	PRECEPTOR.
Minahan, Patrick Robert,	*Wisconsin,*	W. E. Minahan.
Mutchler, John A., B.S.,	*Iowa,*	Faculty.
Nagel, John S., Ph.G.,	*Indiana,*	E. P. Baur.
Nass, Hildus A.,	*Iowa,*	E. H. Williams.
Neff, James M.,	*Illinois,*	Drs. Caldwell and Stealy.
Newhall, Geo. F.,	*Illinois,*	Dr. LeGrange.
Noe, Charles F.,	*Iowa,*	C. J. Winzenried.
Onerton, Timothy V.,	*Louisiana,*	James McCrossie.
Page, Addison C., A.B.,	*Iowa,*	W. Hutchinson.
Pagelson, Otto Hugo, B.S.,	*Michigan,*	E. H. Hofma.
Pence, Lawrence W., B.D.,	*Iowa,*	J. I. Phillips.
Pennington, William Robert,	*Missouri,*	James Hedden.
Petersmeyer, William,	*Iowa,*	F. S. Johnson.
Phillips, Mrs. Jennie Lind,	*Illinois,*	H. B. McChensey.
Pietrowicz, Stephen R., Ph.G.,	*Illinois,*	E. C. Seufert.
Pleth, V. V., M.D., A.B.,	*Illinois,*	Faculty.
Pratz, Fred D., A.B.,	*Illinois,*	C. F. Banta.
Proudfoot, Charles P.,	*Iowa,*	Faculty.
Purington, William A.,	*Maine,*	C. P. H. Paul.
Reynolds, Neson W.,	*Wisconsin,*	Faculty.
Rogers, Henry C.,	*Iowa,*	Geo. Inglis.
Roszell, Roy A.,	*Iowa,*	Faculty.
Rubin, George,	*Illinois,*	Faculty.
Scholes, Paul S., A.B.,	*Illinois,*	J. F. Percy.
Schuessler, Henry G.,	*Illinois,*	Martin Cushing.
Schuldt, Franz,	*Illinois,*	J. R. Noel.
Sherin, Wesley Morley,	*Illinois,*	Faculty.
Simpson, Austin U., B.S.,	*Illinois,*	J. H. Miller.
Simpson, Charles E.,	*Iowa,*	M. W. Hill.
Simpson, Daniel G., A.B.,	*Pennsylvania,*	J. M. Martin.
Slater, John H.,	*Iowa,*	Faculty.
Snydacker, Emanuel F.,	*Illinois,*	Boerne Bettman.
Sollenbarger, George H.,	*Iowa,*	E. J. Howard.
Spickermon, Harry R.,	*Illinois,*	R. M. Galloway.
Stayner, William H.,	*New York,*	W. F. B. Wakefield.
Steele, Wm. J., B.S.,	*Illinois,*	D. A. K. Steele.
Stevenson, Bayard F.,	*Indiana,*	G. A. Stevenson.
Stone, Carl Downer,	*Illinois,*	Faculty.
Stone, William T., M.D.,	*New York,*	Faculty.

NAME.	STATE.	PRECEPTOR.
Stotz, Charles F.,	*Illinois,*	Drs. Caldwell and Eckley.
Strohm, Edward H.,	*Illinois,*	Orlando Mitchell.
Swink, Henry J., A.M.,	*Tennessee,*	Faculty.
Vary, William Harold, M.D.,	*Iowa,*	Faculty.
Wald, Olander E.,	*Washington,*	Faculty.
Walsh, James Lawson,	*Michigan,*	C. A. Walsh.
Wegner, William Godfrey,	*Indiana,*	Charles Stoltz.
Wehle, Willibald J., M.D.,	*Wisconsin,*	Faculty.
Wehrman, Jule O., M.D.,	*Ohio,*	Faculty.
Wells, David Gillison, Ph.G.,	*Canada,*	Faculty.
Whitmer, Chas. F., Ph.G.,	*Illinois,*	L. W. Whitmer.
Whitmore, F. B., M.D., B.S.,	*Illinois,*	Faculty.
Whitney, Eugene D., Ph.B.,	*Ohio,*	Faculty.
Wisse, Cornelius,	*Michigan,*	I. Wisse.
Witherspoon, Louis G., B.S.,	*Indiana,*	G. L. Dorsey.
Wolf, Milton C.,	*Illinois,*	J. Frank.
Wolfson, Morris M.,	*Illinois,*	J. D. Perish.
Wright, Charles E.,	*Illinois,*	Faculty.
Wuerth, John Jacob, Ph.G.,	*Kansas,*	C. S. Acker.
Wyland, George Van,	*Indiana,*	C. E. Davis.
Wynekoop, Charles Ira, B.S.,	*Indiana,*	F. E. Wynekoop.

JUNIOR CLASS

Albrecht, Charles A., Ph.G.,	*Minnesota,*	O. W. Henssler.
Andrews, Hubert F., B.S.,	*Utah,*	Faculty.
Backus, Jesse W.,	*Michigan,*	Faculty.
Barnes, Frederick L.,	*Iowa,*	C. C. Coen.
Bay, Hiram H.,	*Illinois,*	A. B. Spach.
Beedy, Lora L.,	*Pennsylvania,*	J. G. Kiernan.
Betz, John C.,	*Illinois,*	A. M. Unger.
Brewer, Edwin J., B.S.,	*Illinois,*	R. J. Nagle.
Brown, James M.,	*Illinois,*	Moreau Brown.
Browning, George S., B.S.,	*Rhode Island,*	C. M. Post.
Burke, Jerome T.,	*Iowa,*	T. F. Burke.
Bush, John H., B.S., Ph.G.,	*Illinois,*	J. B. Walker.
Butkiewicz, Kasmir A., Ph.G.,	*Illinois,*	W. Kuflewski.
Butler, Clarence A.,	*South Dakota,*	Clifton Scott.
Chloupek, E. Arthur,	*Wisconsin,*	E. H. Chloupek.
Coen, Charles M.,	*Illinois,*	Faculty.

NAME.	STATE.	PRECEPTOR.
Conroy, John M.,	*Wisconsin,*	Faculty.
Czarra, Conrad,	*Illinois,*	Faculty.
Dollard, Edmund C.,	*Wisconsin,*	C. R. Nutt.
Dugan, James H., A.B.,	*Illinois,*	Faculty.
Edwards, John M.,	*Minnesota,*	C. F. Warner.
Fantas, Bernard,	*Illinois,*	Faculty.
Feingold, Leon,	*Illinois,*	J. Frank.
Fellows, Marie A.,	*Missouri,*	G. C. Hall.
Frank, Ira,	*Illinois,*	S. Kunz.
Fukala, Charles T.,	*Illinois,*	Vincent Fukala.
Garth, James W.,	*Iowa,*	T. Garth.
Gathmann, Henry F.,	*Illinois,*	J. R. Noel.
Gibson, Louis S., A.B.,	*Illinois,*	J. B. Murphy.
Glass, John L., A.B.,	*Illinois,*	Faculty.
Goggins, Robert J.,	*Wisconsin,*	J. E. Luce.
Grabowicz, B. C., Ph.M.,	*Poland,*	Frank Patera.
Grimes, John P., Ph.G.,	*Illinois,*	J. B. Murphy.
Hammond, Lloyd,	*Indiana,*	F. C. Ristine.
Hampton, Rob Roy,	*Utah,*	A. W. Burrows.
Harris, Fred. G.,	*Illinois,*	A. P. Ohlmacher.
Harris, Ross Allen,	*Ohio,*	A. H. Hiatt.
Hayes, Thomas D., B.S.,	*Louisiana,*	C. F. Dight.
Haynes, Halbert A., B.S.,	*Indiana,*	R. L. James.
Heald, Harvey C., B.S.,	*Nebraska,*	Faculty.
Herzog, Albert,	*Illinois,*	E. W. Weis.
Hillard, Thomas R., A.B.,	*Pennsylvania,*	R. J. Greer.
Hillebrand, Henry J.,	*Illinois,*	Dr. Dahl.
Hukill, Hannah Luella,	*Illinois,*	Faculty.
Hummell, Charles C., Ph.G.,	*Iowa,*	G. H. Crane.
Jenkins, Charles E., B.S.,	*Iowa,*	J. F. Nicol.
Kay, Abbott E.,	*Illinois,*	A. H. Taggert.
Kelley, Luke H., B.S.,	*Indiana,*	H. M. Evans.
Klein, Matthias J.,	*Illinois,*	E. G. Earle.
Klokke, W. Emil,	*Illinois,*	W. T. Eckley.
Knudson, Frank B., Ph.G.,	*Illinois,*	Faculty.
Krueger, Albert G.,	*Texas,*	A. B. Parr.
Lafferty, Thomas D.,	*Illinois,*	Faculty.
Lemke, Albert R.,	*Illinois,*	E. H. Butterfield.
Lenard, Robert, Ph.G.,	*Illinois,*	A. Haskanson.
Lerch, William H.,	*Iowa,*	J. J. Schlawig.

NAME.	STATE.	PRECEPTOR.
Long, William G., B.D.,	*Iowa,*	C. L. Marston.
McCarthy, Robert J.,	*New York,*	J. C. Marshall.
McWilliams, Oscar E.,	*Pennsylvania,*	J. E. Hequembourg.
Madajesky, Ernest H., Ph.G.,	*Michigan,*	Drs. Thomas and McCabe.
Meloy, J. Earle,	*New York,*	M. Simons.
Mertens, Herman G.,	*Wisconsin,*	A. P. Andrews.
Metcalf, John E., A.B.,	*Indiana,*	F. J. Hodges.
Meyers, Frank W.,	*Iowa,*	A. Kessler.
Moore, F. Donaldson,	*Illinois,*	W. M. Harsha.
Myers, Fred. W.,	*Iowa,*	W. T. Eckley.
Olson, William C.,	*Minnesota,*	M. Mikkelsen.
Peters, James Alphonsus,	*Iowa,*	James Murphy.
Potter, Jessie Y.,	*Wisconsin,*	C. D. Packard.
Ramsey, Frank P., Ph.G.,	*Ohio,*	William Ramsey.
Reasoner, Matthew A., B.S.,	*Illinois,*	Faculty.
Reich, William F.,	*Wisconsin,*	J. E. Luce.
Rich., R. Gilbert, M.D.C.,	*Iowa,*	Faculty.
Richards, Frederick A.,	*South Dakota,*	W. G. Smith.
Robinson, Samuel A.,	*Texas,*	University of Texas.
Russell, Herman,	*Minnesota,*	C. E. Faucett.
Sanderson, Phillip G.,	*Michigan,*	L. J. Lennox.
Scheib. George F., B.S,	*Illinois,*	L. W. Whitmer.
Schoenberg, Albert J.,	*Illinois,*	J. J. Bell.
Scott, Robert D., Ph.G.,	*Canada,*	A. P. F. Gannuack.
Sisson, Charles Elvin,	*Wisconsin,*	S. R. Wakefield.
Slightam, Clarence H.,	*Wisconsin,*	W. C. Abaly.
Smith, Thurston, A.M.,	*Indiana,*	R. C. Rogers.
Steele, Frank B.,	*Illinois,*	Faculty.
Stillians, Arthur W.,	*Illinois,*	W. E. Quine.
Strader, George L.,	*Nebraska,*	Joseph Morrow.
Strohecker, Samuel M., Ph.G.,	*Pennsylvania,*	Henry Landis.
Sullivan, Eugene A.,	*Illinois,*	F. G. Crowell.
Swanson, John Emil, A.B.,	*Illinois,*	W. S. McClanahan.
Taber, Roland Bert, Ph,G.,	*Michigan,*	F. A. Votey.
Taylor, John R., B.D.,	*Illinois,*	A. L. Moody.
Thomson, Laura Grace,	*Illinois,*	J. H. Salisbury.
Tieken, Theodore, Ph.G.,	*Illinois,*	Faculty.
Timm, Edmund W., Ph.G.,	*Wisconsin,*	Drs. Smith and Luce.
Turner, John H., A.B.,	*Iowa,*	Faculty.

NAME.	STATE.	PRECEPTOR.
Wenzel, John V., Ph.G.,	*Illinois,*	Faculty.
Whitmore, Eugene R., B.S.,	*Wisconsin,*	P. L. Scanlan.
Winans, Edward C., A.B.,	*Michigan,*	E. S. Antisdale.
Wood, Glenn,	*Illinois,*	Faculty.
Wood, W. Weir, A.B.,	*Indiana,*	H. D. Wood.
Yeakel, William K., B.S.,	*Illinois,*	C. C. O'Byrne.
Yingst, Sally A.,	*Illinois,*	Sullivan Howell.
Yoist, John A., A.B.,	*Louisiana,*	G. Hubbard.
Zurawski, Kasimir A., Ph.G.,	*Illinois,*	Theodore Kodio.

SOPHOMORE CLASS

Ball, Edmund J.,	*Indiana,*	Faculty.
Bauman, Frederick, Ph.G.,	*Switzerland,*	Adolph Gehrmann.
Birkelund, John R., A.B.,	*Denmark,*	W. N. Whitney.
Boss, Jacob H.,	*Indiana,*	C. E. Nusbaum.
Block, Max E.,	*Illinois,*	Carl Beck.
Brooks, James D.,	*Illinois,*	Faculty.
Burke, Edward L.,	*Minnesota,*	G. O. Welch.
Buswell, Clark A.,	*Illinois,*	P. McPherson.
Carver, Simon C.,	*Iowa,*	W. F. Carver.
Cassiday, William W.,	*Minnesota,*	W. J. Cochran.
Chittenden, Horace W., Ph.G.,	*Missouri,*	R. H. Chittenden.
Clarke, Floyd S.,	*Iowa,*	W. H. Ensminger.
Corbus, Burton R.,	*Illinois,*	Faculty.
Curtis, Charles R.,	*Pennsylvania,*	R. J. Curtis.
Donavan, Joseph P.,	*Wisconsin,*	W. W. Gill.
Dowdall, Guy G., B.L.,	*Illinois,*	T. M. Cullimore.
Early, Calvin S., Ph.G.,	*Ohio,*	Faculty.
Flippin, George A.,	*Nebraska,*	Faculty.
Fletcher, William R.,	*Illinois,*	Faculty.
Gantt, John L.,	*Texas,*	Faculty.
Gaul, Adolph, Ph.G.,	*Illinois,*	Rudolph Menn.
Geiger, Arthur H.,	*Illinois,*	Henry Geiger.
Giles, William W.,	*Illinois,*	Faculty.
Gilmore, Clifford F., B.S.,	*Ohio,*	Faculty.
Hamilton, Howard B., A.B.,	*Iowa,*	C. W. McLaughlin.
Hannon, H. Blake,	*Illinois,*	G. H. McNemer.
Hart, Henry G.,	*Illinois,*	T. A. Davis.
Heath, Clarence W., B.L.,	*Michigan,*	John Bell.
Hixson, Robert B.,	*Minnesota,*	A. D. Larson.

NAME.	STATE.	PRECEPTOR.
Howe, Arden N.,	*Michigan,*	G. C. Young.
Hummel, Edward P.,	*Iowa,*	Faculty.
Hurst, Everett,	*Indiana,*	Faculty.
Hyde, Edward E., A.B.,	*Illinois,*	H. P. Newman.
Jakubowski, Siegfrid,	*Germany,*	Faculty.
Jacobson, August, Ph.G.,	*Wisconsin,*	J. P. Lee.
Johnston, Robert M., A.B.,	*Pennsylvania,*	Faculty.
Kerrigan, George P.,	*Illinois,*	D. A. K. Steele.
King, Louis, Ph.G.,	*New York,*	Faculty.
Knauf, Frederick P.,	*Wisconsin,*	R. W. Monk.
Laben, George J., B.S.,	*Indiana,*	Dr. Blackstone.
Lang, John M.,	*Illinois,*	C. N. Ballard.
Liss, Julius, Ph.G.,	*Illinois,*	Faculty.
McConnell, John W.,	*Illinois,*	Faculty.
McCormick, Olin,	*Illinois,*	F. B. Lovell.
McCray, Walter R., Ph.G.,	*Iowa,*	J. W. McCray.
Macdonald, Charles,	*Illinois,*	Faculty.
Major, William, B.S.,	*Illinois,*	N. B. Crawford.
Mason, Harry P.,	*Iowa,*	Faculty.
Martin, H. Ralph,	*Illinois,*	E. H. Graves.
Metz, Irvin T., A.B.,	*Indiana,*	Faculty.
Miller, Gustav A.,	*Illinois,*	G. F. Butler.
Milroy, William D., A.B.,	*Indiana,*	Carl Eigenmann.
Moffett, William N., B.S.,	*Iowa,*	B. S. Crouse.
Moldenhaur, Gustav H.,	*Illinois,*	C. A. Earle.
Monahan, Richard C.,	*Iowa,*	G. A. Smith.
Morrill, Arthur B.,	*Illinois,*	J. L. Morrill.
Morse, Mrs. Clara Kellogg,	*California,*	Faculty.
Muehlmann, Carl G., Ph.G.,	*Illinois,*	W. M. Harsha.
Neir, William J.,	*Illinois,*	F. Linden.
Norsman, Soren S.,	*Wisconsin,*	G. S. Seim.
North, Frank E.,	*Illinois,*	E. E. Kerr.
Odoardo, Antonio F., A.B.,	*Cuba,*	Faculty.
Parsons, Stephen T.,	*Iowa,*	Artie Folsom.
Phalen, James M., Ph.G.,	*Illinois,*	C. M. Johnson.
Pinkerton, Walter J.,	*Wisconsin,*	L. H. Pelton.
Potter, Ward E., Ph.G.,	*Illinois,*	Faculty.
Purcell, Harry E.,	*Wisconsin,*	C. A. Harper.
Rock, Henry J., B. S.,	*South Dakota,*	J. L. Harris.
Rose, Felix E.,	*Wisconsin,*	J. D. Moraux.

NAME.	STATE.	PRECEPTOR.
Rouse, Elmer E.,	*Michigan,*	C. A. Winans.
Runyan, Charler P.,	*Indiana,*	Faculty.
Scholtes, Theodore W.,	*Minnesota,*	W. J. Cochran.
Schultz, Stephen I.,	*Illinois,*	J. A. Frain.
Sheppard, Louis D.,	*Illinois,*	T. A. Davis.
Smith, Hugh E.,	*Michigan,*	Dr. Scott.
Stockton, William C.,	*Ohio,*	Faculty.
Stogol, Jacob B.,	*Illinois,*	J. Silverberg.
Syverson, Elmer L., B.L.,	*South Dakota,*	H. A. Peabody.
Teschan, Rudolf F.,	*Wisconsin,*	R. C. Teschan.
Twohig, Henry E.,	*Wisconsin,*	J. P. Connell.
Tyson, Earle H.,	*Iowa,*	E. Sherman.
Vincent, Henry A.,	*Wisconsin,*	J. E. Luce.
Voight, C. Bernard,	*Illinois,*	R. J. Coultas.
Voss, Carl, A.M.,	*Norway,*	O. H. Berg.
Wall, Charles D.,	*Illinois,*	T. A. Davis.
Weakley, W. Harl, B.S.,	*Pennsylvania,*	Faculty.
West, Theodore C.,	*Wisconsin,*	G. F. Butler.
Yung, J. Rudolph,	*Indiana,*	C. Gertsmeyer.
Zaleski, Joseph P., Ph.G.,	*Poland,*	S. T. Felmbee.

FRESHMAN CLASS

Addleman, Irving M.,	*Wisconsin,*	S. W. French.
Ames, Andrew J.,	*Minnesota,*	Faculty.
Annis, Reginald F.,	*Wisconsin,*	Drs. Daniels and Packard.
Apfelbaum, David M.,	*Illinois,*	S. L. Weber.
Berven, Jacob O.,	*Illinois,*	T. M. Stixrud.
Birk, John W.,	*Ohio,*	J. A. Chesney.
Blackwelder, Frederick C.,	*Illinois,*	J. F. Blackwelder.
Bowen, Mrs. Marie E.,	*Illinois,*	Faculty.
Burke, Edward W.,	*Iowa,*	W. P. Burke.
Burrell, Henry J.,	*Michigan,*	E. S. Antisdale.
Buss, Francis J.,	*Illinois,*	I. Wisse.
Cameron, Warren L.,	*Oregon,*	Drs. Geary and Pickel.
Carpenter, Cora W.,	*Colorado,*	Faculty.
Chassell, J. Langdon,	*Iowa,*	W. P. Burke.
Church, Elmer E.,	*Illinois,*	Faculty.
Clark, Leslie W.,	*Wisconsin,*	T. A. Davis.

NAME.	STATE.	PRECEPTOR.
Clemmons, E. Jay,	*South Dakota,*	Faculty.
Coates, Sintsford B.,	*Illinois,*	Faculty.
Colburn, George A.,	*Illinois,*	J. E. Colburn.
Conway, Hugh P.,	*Wisconsin,*	Faculty.
Corbus, B. Clark,	*Illinois,*	J. P. Corbus.
Cunningham, William D.,	*Pennsylvania,*	Faculty.
Dethlefsen, George H.,	*Illinois,*	E. I. Hook.
Domer, Walter A.,	*Indiana,*	G. W. Harding.
Emrich, George L.,	*Illinois,*	S. C. Stanton.
English, Edward G.,	*Wisconsin,*	W. T. English.
Fox, Harry W.,	*Michigan,*	Faculty.
Gorrell, Talbot J. H.,	*Illinois,*	Faculty.
Greenman, John W.,	*Iowa,*	Faculty.
Gustafson, Joseph A.,	*Illinois,*	E. V. D. Morris.
Heinzel, Nicholas,	*Illinois,*	Faculty.
Herrin, Neil L.,	*Michigan,*	Dr. Donlan.
Hicks, J. Calvin,	*Illinois,*	Faculty.
Holmberg, LeRoy J.,	*Wisconsin,*	C. P. Bunsen.
Hombach, William P.,	*Iowa,*	Faculty.
Howard, Harry W.,	*North Dakota,*	J. L. Savage.
Hunt, Hiram H.,	*Iowa,*	A. G. Shellit.
Jefferson, Richard,	*Wisconsin,*	Faculty.
Johnson, Cecil C.,	*Iowa,*	A. R. Leith.
Jordan, Marion S.,	*Iowa,*	T. S. Snyder.
Kennedy, Josie C.,	*Illinois,*	Faculty.
Kinder, R. G. W.,	*Wisconsin,*	Faculty.
Klokow, Charles F.,	*Illinois,*	J. C. Hepburn.
Koch, Wesley A.,	*Illinois,*	J. I. Skelly.
Krohn, Wliam O.,	*Illinois,*	Faculty.
Krotter, George,	*Illinois,*	Faculty.
Lampe, Henry G.,	*Illinois,*	Faculty.
Leist, Johanna,	*Germany,*	Sarah H. Stevenson.
Lennon, Aloysius J.,	*Illinois,*	Martin Cushing.
Ling, Frank,	*Illinois,*	Faculty.
Little, Zack J.,	*Kansas,*	Faculty.
Lloyd, Claude A.,	*Illinois,*	J. T. Wyatt.
Luehrs, Henry E.,	*Wisconsin,*	J. E. Luce.
Martin, Winfred B.,	*Illinois,*	C. E. Wilkinson.
McCoy, William M.,	*Iowa,*	D. S. Fairchild.
McDowell, William O.,	*Iowa,*	D. W. Crouse.

NAME.	STATE.	PRECEPTOR.
McGuinn, James J.,	*Illinois,*	Faculty.
McLaughlin, George,	*Illinois,*	Faculty.
McPherson, Warren G.,	*Illinois,*	R. H. Bailey.
Morton, Frank R.,	*Illinois,*	Faculty.
Newman, William M.,	*Minnesota,*	Faculty.
Noble, Charles M.,	*Illinois,*	Drs. Edwards and Isham.
Ohlmacher, Joseph C.,	*Illinois,*	A. P. Ohlmacher.
Oliver, Clifton I.,	*Iowa,*	W. H. Harriman.
Orcutt, Dwight C.,	*Illinois,*	J. L. Polk.
Osborn, William S.,	*Iowa,*	H. E. Lovejoy.
Polson, Nina D.,	*Missouri,*	Faculty.
Pratt, Mrs. J. Irene,	*Illinois,*	Faculty.
Rogers, Benjamin F.,	*Iowa,*	M. L. Hooper.
Robertson, William F.,	*Iowa,*	Faculty.
Rolfs, Theodore H.,	*Wisconsin,*	Drs. Durr and Teschan.
Ruge, Edward C.,	*Wisconsin,*	R. Sweetman.
Ryon, Ralph M.,	*Illinois,*	Faculty.
Schaeffer, Andrew J.,	*Illinois,*	Faculty.
Scofield, Charles J.,	*Illinois,*	Dr. O'Harra.
Sexton, Ira J.,	*Illinois,*	Drs. Geiger and Heylmann.
Soegarrd, Erik,	*Illinois,*	O. H. Berg.
Solliday, Monroe H.,	*Illinois,*	E. M. Alverson.
Sommers, Julius C.,	*Wisconsin,*	C. A. Harper.
Talmage, George S.,	*Indiana,*	A. G. Grubb.
Taylor, Lucius L.,	*Wisconsin,*	Faculty.
Turner, D. Ashley,	*Nevada,*	J. D. Campbell.
Urquhart, Roy T.,	*Indiana,*	Faculty.
Wall, Frank J. A.,	*Illinois,*	Drs. Sullivan and Rieley.
Weaver, W. Claude,	*Illinois,*	W. L. Linberg.
Weber, Carl E.,	*Illinois,*	M. L. Goodkind.
West, E. Talmage,	*Tennessee,*	Faculty.
Westerlund, Joseph E.,	*Illinois,*	Faculty.
Wiltfong, Charles O.,	*Indiana,*	W. S. Shafer.
Zabokrtsky, Joseph,	*Iowa,*	W. A. Manchester.

SCHOOL OF PHARMACY

SENIORS

Ashmore, Joseph Samuel,	*Elizabeth.*
Atzel, George William,	*Chicago.*
Bakkers, John,	*Chicago.*
Bauer, Herbert Arthur,	*Kilbourn, Wis.*
Bowman, William Townzen,	*Moweaqua.*
Brenner, Bert Lemon,	*Rensselaer, Ind.*
Clark, Harry Alexander,	*Carmi.*
Donaberger, Samuel Bricker,	*Lebanon, Pa.*
Elich, Herman Frederick,	*Chicago.*
Elisburg, Louis Albert,	*Chicago.*
Freeman, Arthur Wardo,	*Vermont.*
Gray, Margaret McClintock,	*Chicago.*
Harris, Andrew Hope,	*Alexandria, S. Dak.*
Hathaway, Charles Edwin,	*Freeport.*
Hermann, William Frederick,	*La Salle.*
Holmstead, Axel Sanfred,	*Chicago.*
Honens, Hugh Benton,	*Milan.*
Huddleston, Clyde Ernest,	*Farmer City.*
Janda, Joseph,	*Chicago.*
Jones, Charles Everett,	*Greenwood.*
Kalpus, George Jacob,	*Tiffin, Ohio.*
Kloppenburg, Joseph Robert,	*Springfield.*
Kops, William Gabriel Joseph,	*Chicago.*
Koropp, Ernest August,	*Mendota.*
Lauber, Bohumil,	*Chicago.*
Linxwiler, Albert,	*Hillsboro.*
Maier, Bertram,	*Chicago.*
Martin, John Wright,	*Wrightsville, Ga.*
Maxwell, Charles Edward,	*Odell.*
Mentz, Otto Herman,	*Chicago.*
Moore, Algy Charles,	*Wilmington.*
Neverman, Edward Paul Albert,	*Neillsville, Wis.*
Olsen, Egil Thorbjorn,	*Chicago.*
Rainey, Charles Francis,	*Arcadia, Wis.*
Ruhland, Charles Theodore Fred. Wm.	*Milwaukee, Wis.*
Schultz, Ziska Erhart,	*Mendota.*
Schultz, Emil Henry,	*Neenah, Wis.*
Siedenburg, Frank,	*Elizabeth.*

Smale, William,	*Chicago.*
Sobel, Maximillian,	*Chicago.*
Sorensen, John Julius,	*Chicago.*
Steinfeldt, Adolph Emanuel,	*Stratford, Ia.*
Stroetzel, William,	*Chicago.*
Thomson, Charles Reuben,	*Grayslake.*
Van deLuyster, John,	*Grand Rapids, Mich.*
Warhanik, Charles Augustus,	*Chicago.*
Watters, Mark Henry,	*Castleton, Vt.*
Weigand, Henry, Jr.,	*Chicago.*
Wiedel, Paul Harry,	*Chicago.*
Wright, Margaret Louise,	

JUNIORS

Arnold, George Edward,	*Watseka.*
Barnett, Moses,	*Evansville, Ind.*
Bartells, Charles Waldron,	*Camp Point.*
Bentley, Hugh Burton,	*Chassell, Mich.*
Boehm, Rudolph Siegfried,	*Chicago.*
Brady, Horatius Thomas Addis,	*Chicago.*
Brand, Otto Axel Bernard,	*Chicago.*
Buchholz, William John,	*Hooper, Neb.*
Burmeister, Henry Joseph,	*Chicago.*
Chisin, John Sam,	*Argonia, Kas.*
Condrey, Maynard Clyde,	*Oblong.*
Conklyn, Frank Shelmire,	*Manchester, Mich.*
Czaja, Peter,	*Chicago.*
vonDanden, Raymond,	*Chicago.*
Dauber, Adolph,	*Peru.*
Davis, Leonard Watkins,	*Topeka, Kas.*
Dougherty, Arthur,	*Macomb.*
Dudenbostel, Louis Ernest,	*Campbell Hill.*
Ellmann, Alfred,	*Oconto, Wis.*
Emerson, Irving Lewis,	*Sauk Center, Minn.*
Fahrner, Pius Michael,	*Joliet.*
Fax, Calvin Pliny,	*Chicago.*
Friedlander, John David,	*Chicago.*
Goodman, Lewis,	*Chicago.*
Greene, Grove,	*Marshall, Mich.*
Griffith, Marcus Adelbert,	*Dundee.*
Haeseler, Frank Preston,	*Mt. Vernon, Ia.*

Harder, Frank Ramsey,	*Pittsfield.*
Harris, Frank Anthony,	*Galena.*
Hartig, Henry,	*Peoria.*
Hawley, Robert Coleman,	*Mound City.*
Heidbreder, Albert Henry,	*Quincy.*
Herbold, Charles,	*Peru.*
Hoffsted, John Lawrence,	*Chicago.*
Holaday, Oren Perry,	*Georgetown.*
Hosteny, Joseph Nevi,	*Chicago.*
Hottinger, Joseph Andrew,	*Chicago.*
Jansen, William Leonard,	*Quincy.*
Johnson, Alva Andrew,	*Kilbourn, Wis.*
Joubert, Louis Joseph,	*Kankakee.*
Joyner, Wilbur Newell,	*Chicago.*
Jungk, Walter August,	*Chicago.*
Kirby, George Bell,	*Clarksville, Tenn.*
Kucera, Anton,	*Hazelhurst, Wis.*
McCoy, Laul Verne,	*Dassell, Minn.*
McKinnie, Lewis Hugh,	*Viola.*
McMillan, Herbert Lewis,	*Sunbeam.*
Marvin, Earle Zebina,	*Coldwater, Mich.*
Meinger, Alonzo Edward,	*Sioux City, Ia.*
Mercer, Robert John,	*Burlington, Ia.*
Metz, John Joseph,	*Chicago.*
Michelmann, Albert,	*Quincy.*
Mitchell, Jay Howard,	*Chicago.*
Mortland, Arthur Caldwell,	*Edgerton, Ohio.*
Mueller, Carl,	*Kansas City, Mo.*
Munsterman, Henry Albert,	*Chicago.*
Newland, John Beach,	*Palestine.*
Nickerson, Howard Arthur,	*Buchanan, Mich.*
Nikodem, Charles Valentine,	*Chicago.*
Nims, Boyden,	*Mt. Holly, N. C.*
Pahnke, August Albert,	*Chicago.*
Parker, Oren Francis,	*Rensselaer, Ind.*
Pick, Emie Edward,	*Chicago.*
Pokorney, Frank Joseph,	*Chicago.*
Priest, Fred Horace,	*Hastings, Ia.*
Prince, Charles Franklin,	*Beardstown.*
Reuter, William Conrad,	*Chicago.*
Robson, Andrew Jackson,	*Joliet.*

Schomer, Michael Frank,	*Aurora.*
Seyfarth, Clarence Alexander,	*Blue Island.*
Shambaugh, Ray Leroy,	*Arlington, Ia.*
Slayter, Charles Elmer,	*Cozad, Neb.*
Smith, Frank George Douglas,	*Grand Forks, N. Dak.*
Smith, Robert Clyde,	*Oak Park.*
Steyer, George Edward,	*Chicago.*
Strait, Burton Emra,	*Ottawa.*
Susa, Joseph James,	*Chicago.*
Swanson, Harold Gideon,	*Chicago.*
Talbot, Francis James,	*Chicago.*
Taylor, George Owen,	*Chicago.*
Taylor, Raymond Eugene,	*Chicago.*
Utt, Alfred Reuben,	*Pittsfield.*
Vannatta, Dewitt Snow,	*Galesburg.*
Werber, Max Frederick,	*Chicago.*
Williams J. H,	*Long Creek, Ore.*
Wilson, Don Edward,	*Bonham, Tex.*
Woelz, Frederick Wilhelm,	*Green Bay, Wis.*
Wright, Herbert Collins,	*Rockford.*
Zippel, Walter,	*Chicago.*

SPECIAL

Barrett, William Craig, Ph.G.,	*Highwood.*

PREPARATORY SCHOOL

Adams, Frank E,	*Lintner.*
Allen, John Newell,	*Hoopeston.*
Bailiff, Lucius Fremont,	*Lovett, Ind.*
Barnett, Arthur,	*Hallsville.*
Beasley, Sally Louise,	*Champaign.*
Bennett, William Lee,	*Colchester.*
Black, Laura Louise,	*Urbana.*
Block, Edgar William,	*Sidney.*
Bopp, William George,	*Chicago.*
Boulden, Darwin,	*Eddyville.*
Bowers, Lloyd Emrick,	*Brookville.*
Boyd, Lulu Stella,	*Sidney.*
Breiner, John Francis,	*Sciota.*
Bridge, Horace Lawrence,	*Solsville, N. Y.*
Brittin, Frederick,	*Cantrall, Ia.*

Brown, Warren Howe,	*Urbana.*
Brundage, Martin Denman,	*Malta.*
Buell, Fred Allen,	*Ridge Farm.*
Burrill, Mildred Ann,	*Urbana.*
Busey, Paul,	*Urbana.*
Cadwell, Charles Nickerson,	*Urbana.*
Carper, Ulysses Stanton,	*Seymour.*
Carson, Thomas Francis,	*Urbana.*
Carter, Ira Calvin,	*St. Charles, Minn.*
Carter, Opal Gertrude,	*Champaign.*
Chapin, Arlo,	*Champaign.*
Clark, Elwyn Lorenzo,	*Momence.*
Coe, John Edwin,	*Rochester.*
Collins, Maud Myrtle,	*Bondville.*
Conard, Frank Eli,	*Monticello.*
Conner, Thomas John Antoine,	*Prairie du Rocher.*
Craig, Arthur Emanuel,	*Fair Grange.*
Crane, Zaide Varney,	*Champaign.*
Crawford, Ollie Grace,	*Bondville.*
Crissey, Ruth Elizabeth,	*Champaign.*
Cummings, Joseph Ross,	*Monmouth.*
Daniels, Charles Edgar,	*Savoy.*
Davis, Cleon Leslie,	*Mt. Zion.*
Davis, George Royal, Jr.,	*Chicago.*
Davis, Oliver Marcy,	*Evanston.*
Dean, Cora Edna,	*Evanston.*
Donoghue, William Joseph,	*LaSalle.*
Draper, Charlotte Enid,	*Hakodate, Japan.*
Draper, Edwin Lyon,	*Urbana.*
Drury, Clair Fred,	*New Boston.*
Dunkin, Gilbert Leslie,	*Urbana.*
Evans, Earl Ralph,	*Hammond.*
Ferry, Thomas Roy,	*Pleasant Plains.*
Forbes, Ethel Clara Schumann,	*Urbana.*
Forbes, Winifred,	*Urbana.*
Frazier, James William,	*Bushton.*
Freeman, Julius Buckingham,	*Bloomington.*
Fullenwider, Thomas Irwin,	*Mechanicsburg.*
Fullerton, Hugh Regnier,	*Havana.*
Ferguson, Anna,	*Casey.*
Gaffin, Benjamin Heistand,	*Leaf River.*

Gaffin, Charles Harold,	*Leaf River.*
Gallaher, Fred Lee,	*Mt. Palatine.*
Gibbs, Elizabeth Hayward,	*Riverton, Ky.*
Gifford, Roy Lytton,	*Rantoul.*
Goff, Mary Emma,	*Rantoul.*
Greene, Josephine Maxwell,	*Ramsey.*
Greer, James Richard,	*Fairmount.*
Grevencamp, Henry Herman,	*Havana.*
Hanson, Gertrude Lucie,	*Urbana.*
Harbeson, Davis Lawler,	*Stewardson.*
Harris, Chester Ellis,	*Ogden.*
Harris, Thaddeus Sidney,	*Modesto.*
Haussler, Robert Edward,	*Centralia.*
Helm, James Wilson, Jr.,	*Danville.*
Herring, Horace,	*Civer.*
Hidy, Llora Mabel,	*Mansfield.*
Higgins, Samuel Chase,	*El Paso, Texas.*
Hoadley, Lester Joseph,	*Earlville.*
Hobart, Harry Edwin,	*Armington.*
Hopper, Flora Evelyn,	*Jamaica.*
Hopper, Margaret,	*Jamaica.*
Hopper, Orvil Frank,	*Jamaica.*
Howard, Lida Frances,	*Clinton.*
Howell, Carrie Barnes,	*Champaign.*
Huntoon, George Edward,	*Moline.*
Jacobs, Manuel Joseph,	*Chicago.*
Johnson, Clarence Eugene,	*Champaign.*
Keniston, Charles Herbert,	*Wilton Center.*
Kile, Sadie Alice,	*Cisco.*
Kilbury, Asa,	*St. Joseph.*
Kincaid, Anna Laura,	*Athens.*
King, Jacob Weinberg,	*Augusta.*
Kirby, Nellie Maye,	*Monticello.*
Kruse, Richard Fred,	*Davenport, Ia.*
Kuhn, Leopold,	*Champaign.*
Lawhead, Maud Madge,	*Urbana.*
Linden, Frank William,	*Chicago.*
Lee, Kittie Grace,	*Homer.*
Lippincott, Charles Allen,	*Rardin.*
Lorenson, John Hanson,	*Lovington.*
McCracken, George Milas,	*Pana.*

McFarland, Herman Earl,	*Mendon.*
McShane, John James Hugh,	*Ivesdale.*
McVay, Camden J,	*Champaign.*
Manny, Clay Yates,	*Urbana.*
Marsh, Albert Leroy,	*Pana.*
Martin, Albert Carey,	*LaSalle.*
Martin, James Walter,	*Wilmington.*
Martinie, Charles Austin,	*Urbana.*
Mathis, Roy Hayes,	*Prophetstown.*
Means, Lee David,	*Saybrook.*
Mitchel, Lyman Betts,	*Danvers.*
Mitchel, Walter Ormsby,	*Danvers.*
Moore, Claude Bliss,	*Wilmington.*
Moran, Mark Asher,	*Canton.*
Morris, Robert Lyman,	*Maroa.*
Mykins, Perry H,	*Battle Creek, Mich.*
Nebeker, Milo Washington,	*Davenport, Ia.*
Neikirk, John Oscar,	*Forest City.*
Newbold, Theodore Aubrey,	*Joliet.*
Null, Louis Agassiz,	*Blandinsville.*
Onken, John August,	*Harpster.*
Perrigo, Lyle Donovan,	*Urbana.*
Powell, John Thomas,	*Belleflower.*
Prehm, Walter Fred,	*Chicago.*
Price, Hugh Mitchel,	*Champaign.*
Pritchard, Frank Preston,	*Fisher.*
Purvines, George Oscar,	*Pleasant Plains.*
Quinn, Jennie May,	*Champaign.*
Railsback, Charles Philip,	*Tazewell.*
Read, Edgar Newton,	*Urbana.*
Reasoner, Clara Beck,	*Ogden.*
Richardson, James Roy,	*Pleasant Plains.*
Ricker, Ethel,	*Urbana.*
Rogers, Lawrence Stevens,	*Mendota.*
Rogers, Myron Cyrus,	*Prophetstown.*
Rolfe, Susie Farley,	*Champaign.*
Sauers, Arthur Andrew,	*Earlville.*
Scott, Vera Charlotte,	*Mahomet.*
Seymour, Roy Vincent,	*Dwight.*
Smith, David Aaron,	*Claytonville.*
Smith, James Howard,	*Sidney.*

Snyder, Simeon M,	*Metamora.*
Sonnemann, Floyd,	*Vandalia.*
Sparks, Annie Elnora,	*Urbana.*
Spence, Will Potter,	*Macomb.*
Stanley, Harvey Hatten,	*Champaign.*
Stewart, John Hardin,	*Exeter.*
Stark, Claude,	*Champaign.*
Stratton, Isaac Harry,	*Toulon.*
Strouse, Milton,	*Delavan.*
Taylor, Lewis James,	*Earlville.*
Thatcher, Alice Neta,	*Decatur.*
Thomas, William Frederick,	*Bradford.*
Thompson, Clarence,	*Champaign.*
Thompson, Frank Linn,	*Warrensburg.*
Thompson, Fred Bailey,	*Canton.*
Thompson, George Palmer,	*Steward.*
Thompson, Lenora Bell,	*Steward.*
Thompson, McDonald,	*Isabel.*
Thompson, Willard Carr,	*Canton.*
Thornton, Jae James,	*Magnolia.*
Tobin, Louis Michael,	*Urbana.*
Tomlin, Milton Dell,	*Easton.*
Toops, Claude,	*Seymour.*
Toops, George Noble,	*Seymour.*
Trevett, Helen Mary,	*Champaign.*
Tuthill, Lewis Butler,	*Anna.*
Voris, Henry McMunn,	*Neoga.*
Voris, Ralph Emerson,	*Stewardson.*
Waite, Will Clarence,	*Danville.*
Wallace, Jacob H,	*Altamont.*
Webber, Bernard Porter,	*Wenona.*
Webber, Pearl,	*Urbana.*
Wendell, Frank,	*New Holland.*
Whipple, Fred George,	*Chicago.*
Whitaker, Jesse Lee,	*Kinmundy.*
White, Howard Allen,	*Batchtown.*
Whitney, Jay Asa,	*Lostant.*
Whitson, Milton James,	*Davenport, Ia.*
Williams, Elrick,	*Illiopolis.*
Williams, Simon,	*Illiopolis.*
Williamson, Josephine Huldah,	*Champaign.*

Wilson, Margaret Mary,	*LaPlace.*
Womacks, Nita,	*Champaign.*
Wright, Edith,	*Urbana.*
Wright, Lora,	*Urbana.*
Wright, William Wilberforce, Jr.,	*Toulon.*
Yocum, Clyde Hathaway,	*Chestnut.*
Youle, Claude M,	*Saybrook.*
Youle, Floyd Quincy,	*Saybrook.*

SPECIALS IN MUSIC

Besore, Hazel,	*Urbana.*
Breckenridge, Blanche Fargason,	*Urbana.*
Burrill, Irene Elsa,	*Urbana.*
Byerly, Edna Gertrude,	*Urbana.*
Davidson, Hazel Frances,	*Champaign.*
Griffin, Anna Mabel,	*Argenta.*
Grigsby, Mary Louise,	*Blandinsville.*
Laflin, Mary Elizabeth,	*Champaign.*
Payne, Lena Venice,	*Potomac.*
Renner, Wendell Phillips,	*Urbana.*
Stedman, Jeanette,	*Champaign.*
Trevett, Bessie Harriet,	*Champaign.*

SUMMARY OF STUDENTS, 1897-98

	MEN	WOMEN	TOTAL
Graduate School	57	5	62
Resident Graduates	9	7	16
Colleges—			
Seniors	83	10	93
Juniors	93	30	123
Sophomores	117	21	138
Freshmen	173	44	217
Specials	72	53	125
Total	604	170	774
Winter School in Agriculture	23	...	23
Law School—			
First year	33	2	35
Third year	4		4
Total	37	2	39
School of Medicine—			
Seniors	121	4	125
Juniors	98	6	104
Sophomores	88	1	89
Freshmen	84	6	90
Total	391	17	408
School of Pharmacy—			
Seniors	48	2	50
Juniors	89		89
Special	1		1
Total	138	2	140
Preparatory School	145	54	199
	1,338	245	1,583
Deduct counted twice	1		1
Total in University	1,337	245	1,582

HOLDERS OF SCHOLARSHIPS, PRIZES, AND COMMISSIONS

HONORARY SCHOLARSHIPS

Cook,	Barrett, George Francis.
Dupage,	vonOven, Frederick W.
Iroquois,	Dillon, William W.
Kendall,	Seely, Garrett T.
LaSalle,	Clifford, Charles L.
Ogle,	Woolsey, Lulu C.
Stark,	Eagelston, Frank G.
Whiteside,	Bradley, James C.

STATE SCHOLARSHIPS

Champaign,	Hartrick, Louis E.
Champaign,	Black, Alice M.
Coles,	Stubbins, Lewis C.
Coles,	Frost, Frank G.
Cook, 9th Senatorial District,	Rudnick, Paul F. A.
Cumberland,	Lindley, Walter C.
DeKalb,	Radley, Guy R.
DeWitt	Tull, Effie M.
Douglas,	Polk, Robert C.
DuPage,	Hinckley, George C.
Fulton,	Dobbins, Lester C.
Grundy,	Magner, Harold B.
Iroquois,	Pletcher, Nuba M.
Kane,	Hoppin, Charles A.
LaSalle,	Olson, Joseph M.
McLean,	Hartrick, D. Clara.
McLean,	Reardon, Neal D.
Macon,	Woods, William T.
Macon,	Lytle, Ernest B.
Macoupin,	Otwell, Allen M.
Montgomery,	Barry, George R.
Ogle,	Brayton, Louis F.
Piatt,	Mitchell, Annie.
Piatt,	Hinkle, Ida M.
Richland,	Coen, Homer.

Stark,	Stewart, Miles V.
Tazewell,	Zipf, Ferdinand.
Vermilion,	Hayes, Z. Bernice.
Whiteside,	Warner, Harry J.
Will,	Reeves, George I.

CHICAGO CLUB LOAN FUND

Mesiroff, Joseph.

WINNER OF HAZELTON PRIZE MEDAL

Cadet Corporal, Ernest Thompson Robbins.

COMMISSIONS AS BREVET CAPTAIN ILLINOIS NATIONAL GUARD, ISSUED BY THE GOVERNOR IN 1897

Ralph P. Brower, Alvin C. Beal, Albert C. Hobart, Charles W. Leigh, and Horace C. Porter.

ROSTER OF OFFICERS AND NON-COMMISSIONED OFFICERS, BATTALION OF THE UNIVERSITY OF ILLINOIS

Major, A. St. J. Williamson.

Adjutant, W. A. Fraser.

Sergeant Major, A. R. Johnston.

Color Sergeant, E. E. Hinrichsen.

Drum Major, Fred Lowenthal.

Company A—Captain, M. I. Hopkins; First Lieutenants, G. W. Hubbard, R. L. Fowler; First Sergeant, C. H. Chapman; Sergeants, R. S. Wiley, H. E. Keeney, W. H. Few, F. G. Allen, B. F. McGee.

Company B—Captain, A. D. DuBois; First Lieutenants, J. C. Harrower, E. W. P. Flesch; First Sergeant, C. L. Eddy; Sergeants, J. P. Kratz, G. R. Smith, W. C. Evans, H. A. Soverhill.

Company C—Captain, D. R. Enochs; First Lieutenants, M. M. Willcox, C. G. Lawrence; First Sergeant, E. T. Robbins; Sergeants, W. G. Palmer, J. G. Appelquist, W. P. Norton, F. D. Francis, O. L. Housel.

Company D—Captain, O. M. Rhodes; First Lieutenant, W. A. Hawley; First Sergeant, C. E. Sandberg; Sergeants, A. Kuehn, Robt. Gray, W. G. Foster, H. W. Baker, L. C. Dobbins, L. S. Rogers.

Battery—Captain, H. M. May; First Sergeant, C. L. Logue; Sergeants, R. Thompson, C. H. Charles.

THE UNIVERSITY CALENDAR
1898-99

FALL TERM, 1898

Sept. 8, Thursday.	Entrance Examinations begin.
Sept. 12, 13, Monday and Tuesday.	Registration Days.
Sept. 14, Wednesday.	Instruction begins.
Nov. 7, Monday.	Latest date for announcing Subjects of Theses.
Dec. 14, Wednesday.	Term Examinations begin.
Dec. 16, Friday.	Term ends.

WINTER TERM, 1899

Jan. 2, Monday.	Entrance Examinations.
Jan. 3, Tuesday.	Registration Day.
Jan. 4, Wednesday.	Instruction begins.
Feb. 20, Monday.	Prize Debate.
March 15, Wednesday.	Term Examinations begin.
March 17, Friday.	Term ends.

SPRING TERM, 1899

March 28, Tuesday.	Registration Day.
March 29, Wednesday.	Instruction begins.
May 17, 18, 19, Wednesday evening to Friday noon.	University High School Conference.
May 19, Friday.	Interscholastic Oratorical Contest.
May 20, Saturday.	Interscholastic Athletic meet.
May 29, Monday.	Hazleton Prize Drill.
May 30, Tuesday.	Competitive Drill.
June 6, Tuesday.	Latest Day for Acceptance of Theses.
June 7, Wednesday.	Term Examinations begin.
June 11, Sunday.	Baccalaureate Address.
June 12, Monday.	Class Day.
June 13, Tuesday.	Alumni Day and Oratorical Contest.
June 14, Wednesday.	Twenty-seventh Annual Commencement.

FALL TERM, 1899

Sept. 7, Thursday.	Entrance Examinations begin.
Sept. 11, 12, Monday and Tuesday.	Registration Days.
Sept. 13, Wednesday.	Instruction begins.
Nov. 6, Monday.	Latest date for announcing Subjects of Theses.
Dec. 13, Wednesday.	Term Examinations begin.
Dec. 14, Friday.	Term ends.

1898

SEPTEMBER

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OCTOBER

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NOVEMBER

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DECEMBER

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1899

JANUARY

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JUNE

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AUGUST

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SEPTEMBER

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OCTOBER

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NOVEMBER

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DECEMBER

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